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1957

ANALYSIS OF SOME RESULTS IN
HOSPITAL OBSTETRICS
IN ARUBA (NETHERLANDS ANTILLES)



J. A. M. DE RUYTER

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PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR
IN DE GENEESKUNDE AAN DE RIJSUNIVERSITEIT
TE LEIDEN OP GEZAG VAN DE RECTOR MAGNIFICUS
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TE 15 UUR

DOOR

JACOBUS ADRIANUS MARIA DE RUYTER
geboren te Noordwijk in 1920

H. E. STENFERT KROESE N.V. — LEIDEN

PROMOTOR: PROF. DR. A. J. M. HOLMER

CONTENTS

	Page
I. INTRODUCTION	1
II. GENERAL SURVEY	4
III. SOME BRIEF NOTES ON PATHOLOGY OF THE THREE STAGES OF PREGNANCY	10
IV. THE TOXEMIAS OF PREGNANCY	15
V. MALPRESENTATION	33
VI. ANTE-NATAL BLEEDING IN LATE PREGNANCY	44
VII. PREMATUREITY	49
VIII. THE RHESUS FACTOR	59
IX. CONGENITAL MALFORMATIONS.	65
X. ANESTHESIA AND PREVENTABLE DEATHS	73
XI. ABORTIONS AND MOLAPREGNANCIES	81

I

INTRODUCTION

The obstetrical results surveyed in this thesis were obtained in the Lago Hospital on the Island of Aruba.

The Island of Aruba belongs to the Netherlands Antilles and is the most westward of the Leeward Islands. Its location is about 70 kilometers off the main coast of Venezuela and it lies below the Tropic of Cancer and thus in the tropics.

The length is about 30 kilometers and the width at its widest part 8 to 9 kilometers. The surface area is 181 quadrate kilometers, as compared with the Dutch Island of Texel, which is 184 quadrate kilometers ¹.

The climate according to Dr. Nordlohne ¹ is a dry steppe = mezquite. The average temperature is 25.6° Celsius = 78.1° Fahrenheit. The average humidity is 73.9 and a constant north-east tradewind throughout most of the year keeps the climate more comfortable. The rainfall differs periodically and, averaged over a 25-year period, measured by the laboratories of the Lago Refinery, 18.99 inches per year. The driest month is March with an average rainfall of 0.37 inches and the most rain falls in November with an average of 4.47 inches.

The population density was in 1954, 308 per square kilometer, with a total in that year of 55,912 ². In 1929 just in the beginning of the establishment of the oil industry, this was 12,224. The greater part of these must thus have come from other countries. Therefore, many different nationalities and races now make up the total population. The native language is Papiamentu, but English is the trade and Dutch the official government language.

The religion of the Arubans is mainly Roman-Catholic and the other population groups, besides this one, consist of many different Protestant sects and other religions.

Economically, the Lago Oil and Transport Company, Limited is the main industry. This Company, which is a subsidiary of the Standard Oil Company (N.J.), has on this Island one of the world's largest operating refineries.

Agriculture and livestock breeding are of minor importance.

As the Island itself is bare and the soil inadequate, most of the food has to be imported, except for some corn, a type of kaffir corn, and beans which was and still is for a great part of the original people besides fish the main food. Fruits and vegetables also have mostly to be imported. As there are no drinking water wells, all water is distilled out of seawater, which therefore, as noted by Dr. Steenmyer ³, lacks minerals. According to Dr. Steenmyer, who made an extensive investigation with regard to feeding habits and food substances, it seems that in general the caloric intake is sufficient, with sufficient fats, proteins and carbohydrates with the emphasis on the latter. He found that the vitamin intake was insufficient as is the vegetables consumption. This can be expected, since, as mentioned above, fruits and vegetables and most of the meat have to be imported and therefore are more expensive. Furthermore, with old cooking habits in which the native meals are overcooked, important nutritional substances are spoiled ³. The imported population groups stay more with their own cooking and feeding habits and we believe that their menu is more varied and balanced. The Lago employees are in a fortunate position as they all can buy all types of food in their commissary. The salaries paid by the Company are the best paid in the Caribbean area and, though the living standard is high, the family budget can be well met.

The original Arubans are descendants of Indians, mixed mainly with white Caucasians and little with Negroes. The other population groups are mainly Negroes or of Negro descent and only small groups of Caucasians and other races.

The total number of employees in 1948 working for the oil industry was 8262 and in 1954, it was 6638. The Aruban native percentage did rise from 25.9 to 44.6 % in these years ⁴. This was mainly at cost of the other Caribbeans.

During the seven-year period, 1948—1954, that this thesis covers, the percentage of Aruban employees was 37 %. About 10 % of the employees are so called "foreign staff"; these are nearly all of Caucasian origin and most of them North Americans. All the others, that is 53 %, are people of the surrounding areas, except for some smaller groups such as white Saba people and other Non-negro groups, are of Negro descent.

As we were interested in the obstetrical results in the different groups, I divided our patients into three groups: Arubans, these are the ones of the original Island population; Negroes, etc., these are

the ones from the other Caribbean islands and countries; and Whites, that are definitely of Caucasian origin.

References

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- ² *Statistische Mededelingen*, Dept. van Sociale en Economische Zaken. Willemstad, Curaçao. Mei 1955.
- ³ Verbal Communication, Dr. STEENMYER.
- ⁴ Industrial Relations Department, Lago.

II

GENERAL SURVEY

The Lago Hospital is part of the Medical Department of the Lago Oil & Transport Company, Limited, of which department Dr. R. C. Carrell is the Medical Director.

There are three divisions: the Surgical, the Medical or Internal and the Obstetrical and Gynecological, all three headed by specialists, recognized in their respective specialities. Head of the Obstetrical & Gynecological Division is Dr. J. N. Borbonus.

The hospital is recognized by The Joint Commission on Accreditation of Hospitals of the U.S.A. and Canada, and is one of the best equipped and most modern in the Caribbean area.

All employees with wife and legitimate children (the age of which was recently increased to 18 years) are eligible for medical treatment by this department. No medical treatment outside the Company's concession on the Island is allowed by the physicians of this Medical Department.

The total census for people eligible for treatment is about 22,000; this is about 40 % of the total Island population.

The Obstetrical and Gynecological Division has 36 beds at its disposal, besides beds in the labor rooms.

Obstetrical Routine

On the first visit, when a woman is found to be pregnant, an obstetrical folder is initiated on which the results of the complete physical examination and the previous obstetrical and sickness history are summarized. On this first visit also the Kahn and V.D.R.L. reactions and Rhesus factor are determined. The hemoglobin (by the Haden-Hausser method) and urinalysis, (the albumin is determined by the sulfosalicylic acid method) are rechecked periodically throughout the pregnancy.

The pelvis is evaluated manually and in cases where the pelvis is found to be abnormal, a roentgen pelvimetry by the Snow method is done near the end of the pregnancy. The parity is stated in a four figure code, w-x-y-z, in which w is the total of pregnancies including

the present one, this is the gravidity, x is the number of non-viable wasted gestation products, y is the number of wasted viable gestation products and z is the number of living offspring.

When the expectant mother is found to be Rhesus negative, the Rhesus factor in the husband is also determined and monthly anti-Rhesus agglutinations are determined.

On this initial visit a one sum charge is made for the rest of the prenatal visits, regardless of how many, as long as they are connected with the pregnancy. When during the examination or in the history of the patients there are illnesses, that might influence the pregnancy, the patients are referred to the specific specialist who will summarize his opinion in the obstetrical folder and who will follow the patient up further in close conjunction with the obstetrical department.

A pamphlet containing general hygienic measures and dietary information is given to the patients. Ferrous sulfate and multivitamins are dispensed routinely. In general the patients are seen monthly until the seventh month of their pregnancy; after this, biweekly and in the last month weekly until delivery. The weight and blood pressure are taken each visit and the height of the fundus is measured as of the distal part of the symphysis every other visit.

The co-operation of our patients in general is very good, considering the distance many of them have to travel, as the hospital is located at the outer point of the Island.

On admission for delivery, the women are taken to a special labor room. Here they are bathed and the pubic area is shaved; a soap enema is given, when no contra-indications, routinely. The fetal heart sounds and blood pressure are recorded by a nurse every four hours, as are the uterine contractions. Vitamin K is administered orally and a clear liquid diet, unless they are in active labor, is given.

Rectal examinations to determine the condition of the cervix are done and sterile vaginal examinations only when indicated.

Sedation, such as seconal gr. 3 (= 180 mg.), demerol mg. 100 and scopolamine sulfate gr. 1/150 (= 0.4 mg.) intramuscularly are given when indicated by the attending physician. At complete dilatation or when the delivery is imminent, the patient is taken to the adjoining delivery room where after being placed in the lithotomy position, the exposed area is cleaned with soap, water and zephiran solution (1 : 1000). After this, sterile drapes are applied and a sterile blanket is placed in the heated incubator-resuscitator.

Procaine with adrenalin and eventually hyaluronidase are injected

into the perineum when an episiotomy has to be done; this is also used for pudendal block anesthesia which is more and more used for outlet and low-forceps deliveries. As general anesthetic, sodium pentothal in a 2.5 % solution is used.

The cord of the fetus is clamped with a Ziegles funis clamp, silver nitrate 1 % is placed in the conjunctival sack and a bracelet with name and payroll number of the father is sealed around the wrist.

Routinely, cord blood is taken for the Kahn reaction and, when the mother is Rhesus negative, cord blood is taken also for Coomb's test, etc. After the placenta is delivered, ergotrate is given intravenously and the fundus is held by a nurse for at least one hour, after which the patient is taken to her room. The baby is taken to the nursery where, when it was an operative delivery, a precipitate delivery or when the infant is premature, vitamin K (5 mg.) is given subcutaneously every 8 hours for 24 hours. They are nursed by their mothers, when over 6 lbs. every 4 hours, otherwise every 3 hours. They are weighed in the Anglo Saxon system of avoirdupois daily. Therefore, all weights in this thesis are converted from this system into the metric system, in which for a pound 450 grams and for the ounce 30 grams is used. The mothers are allowed up 24 hours after the delivery and are discharged if all is well on the fifth day postpartum. The postpartum days are counted as of midnight after the day of delivery.

At request of the mother the infant boys are circumcised on the 2nd or 3rd day by the Gomco technique, after the bleeding and clotting time is found to be within normal limits.

About six weeks after discharge from the hospital the patient is seen again in the postnatal clinic. At the same time the baby is brought to the well-baby clinic.

Lately, the babies are vaccinated against smallpox in the well-baby clinic after 6 weeks and no longer in the nursery because many of them had such a reaction that it delayed the discharge of the mother and infant.

A delivery charge is made, which is the same regardless the type of delivery and the postnatal visit or visits are included in this same fee.

During this period of seven years, 1948—1954, there were 6039 deliveries and 6124 new births which is more than 43 % of all births in Aruba during this period¹. There were 81 sets of twins, which is an incidence of 1 in 74 deliveries, and two sets of triplets which is an incidence of 1 in 3000 deliveries. Of the triplets, one set was previable

and all three died; the others, though premature, survived and are well. The heaviest set of twins weighed 7600 grams together, which according to the literature belongs to some of the heavier births reported ².

The approximate distribution of the races (as outlined in the introduction) was:

Arubans	Negroes, etc.	Whites
42 %	51 %	7 %

Over a three-year period the ages of the delivered patients have been condensed into four groups. There were more than 2700 patients and this, we believe, is indicative for the whole group:

19 y.	20—29 y.	30—39 y.	40 and more years
7.1 %	51.7 %	35.9 %	5.2 %

In more than 4200 delivered patients the parity has been condensed into three groups. It may be assumed that these percentages will be representative of all delivered patients.

Para 0	Para I—IV	Para V— and more
21 %	62 %	17 %

It had been noticed that the onset of the menarche of our patients was relatively late, considering the opinion that in tropical countries the menarche would be earlier than in countries with colder climates. Therefore, we have collected in a number (200) of young Aruban primigravidae the age of onset of the first menstruation. We found that the average age was 13.6 years.

In 60 young primigravidae of Negro descent the average age was also 13.6 years.

Below are the number and the percentages of these patients according to age:

Age	Aruban		Negro	
	Total	Percentage	Total	Percentage
10	—	—	—	—
11	7	3.5 %	8	13.3 %
12	25	12.5 %	8	13.3 %
13	57	28.5 %	11	18.3 %
14	60	30 %	15	25 %
15	42	21 %	11	18.3 %
16	5	2.5 %	5	8.3 %
17	4	2 %	2	3.3 %
18	—	—	—	—
Total	200	100 %	60	99.8 %

This shows that in this small group of fertile women in any case the onset of the menarche is not earlier than found in England where the average age was 13.23 years ⁴.

It had also been noticed that fibromata were found more often in Negro than in Aruban women. It is known that in Negro women this condition is more frequent than in Whites ⁵.

In 104 operations, most of these hysterectomies, performed because of myomata, 81 were Negro women, only 8 Aruban and 15 were White. Thus, 78 % of these were Negroes. These operations were all done in a nine-year period. To come to a comparable figure we may use the racial distribution of the patients delivered in this period. Namely: 48 % Negro, 45 % Aruban and 7 % White in 7400 deliveries.

The incidence of presence of myomata that needed surgical intervention in these 7400 patients would be:

Arubans 1 in 416
Negroes, etc. 1 in 44
Whites 1 in 34

Thus, the incidence in White women would be about the same as in women of the Negro group, but we must realize that the

Negro group is no racial entity. It does, however, indicate that this condition in Aruban women is rare.

References

See next chapter.

III

SOME BRIEF NOTES ON PATHOLOGY OF THE THREE STAGES OF PREGNANCY

A. PRENATAL STAGE

As for our patients in general we may state that anemia in the hypochromic form is frequent. The hemoglobin is determined by the Haden-Hauser method. As the anemia is so frequent, we consider a patient anemic, when the hemoglobin content of the blood is below 9 gm/%. Of our patients, 8.7 % were below this figure on one or more examination. The cause of this is not all clear, but the improper diet and the numerous intestinal parasites must be of major importance. Besides bloodtransfusions, that are given to those patients who do not respond to oral iron medication, we also used intravenous and lately intramuscular iron preparations.

Further more, the condition of the teeth, especially in the Aruban group of patients, is in general very bad. Poor hygiene is most likely the major cause.

Maternal Syphilis

A positive Kahn and/or a positive V.D.R.L. reaction was found in 222 pregnant women. The greater percentage of these belong to the Negro group. No spinal fluid examinations are done during pregnancy. There was only one case where the positive Kahn reaction was detected after delivery. This patient had originally a negative Kahn and V.D.R.L. reaction. When she delivered, syphilitic condylomata lata were found and the serologic reactions were positive in mother and infant. Besides this patient, three with syphilitic heart lesions were seen and in the others no specific lesions were detected. None of these had diseases which may give false positive reactions as leprosy, malaria or collagen diseases³. But positive serologic reactions caused by yaws cannot be differentiated from those caused by lues. Yaws does not occur in Aruba, though it is endemic in some of the surrounding areas. We must therefore for all practical purposes treat all of these pregnant women as having latent lues, as in our opinion

most of these have. In the first year of this survey these patients were still treated with neosalvarsan and bismuth, but after that all with penicillin. Total amounts of 4.8—5.1 million units were given.

Of the 222 women, 204 received treatment during the pregnancy, and 18 none. To this group belong the above described case and 17 others of which 15 had in previous pregnancies at least twice a full course of treatment.

Of the 226 newborns out of these pregnancies, 156 had a negative cord Kahn and/or negative V.D.R.L. reaction; in eight it was not examined and 62 infants had a positive serological reaction. Of these only 32 had a follow-up. This was mainly due to lack of interest of the mothers in the well-baby clinic. This means that 50 % of the infants with a positive serological syphilis test were not followed up. Of the 30 infants that were followed up, 26 later became negative, of which 6 did receive some penicillin treatment. Four of the infants still had a positive V.D.R.L. test on rechecks later on, of which three had a weak reaction. These also had no treatment. We have not seen any infant with congenital syphilitic signs during this period. The total perinatal mortality of newborns from mothers with a positive reaction was 7; this is 3.1 % as against an overall perinatal mortality of 3.2 %. There were two stillbirths, of which one from a mother with eclampsia. Of the five neonatal deaths, one infant had a ++++ positive cord Kahn and one premature infant a + cord Kahn, the others had negative serologic reactions.

Diabetes Mellitus

There were eight mothers with a marked diabetes mellitus with a total of eleven newborns during this period, which is relatively few, but four of these mothers were 40 years of age or older. Three of these women received insulin. There were two stillborn fetuses, both in the same mother, who was very unco-operative in controlling her disease. One of these was in connection with a severe toxemia. There was also one neonatal death in which the fetus was in a breech presentation with prolapse of the cord.

Pulmonary Tuberculosis

Nine different mothers had arrested pulmonary tuberculosis and one had active pulmonary tuberculosis with positive sputum. They all did well.

Organic Heart Disease

Twenty-four mothers had organic heart disease, of which eleven were diagnosed as rheumatic valve lesions and three to have syphilitic lesions. Nine had organic congenital malformation of which one was coarctation of the aorta. This one delivered by breech extraction. In total, these patients delivered 48 newborns, of which 24 in this year period, and these were all healthy.

Varicose Veins

This condition is seen very frequently here. We do not have any definite figure on this condition because it is so frequent also in non-grande multiparae that it is not always recorded.

B. NATAL PERIOD

Episiotomies, preferably done by midline incisions, as almost all of them were, had been done in 30 % of our deliveries. Perineal and/or vaginal lacerations did occur in 5 % of the deliveries. Third degree lacerations or extensions of the episiotomy happened 40 times. They all healed well after repair and without any after-effects.

The types of deliveries are reviewed in the last chapter. The percentage of operative deliveries was 22.7, and the incidence of Caesarean Section 2.46 %.

Post-partum bleeding, caused by uterine inertia was seen in 1.5 % of our patients.

Urinary fistulae were seen three times, once after extraction of a hydrocephalic fetus, once after a failed forceps resulting in a caesarean section and once a uretero-vaginal fistula after a Porro caesarean section. This last case resulted in a nephrectomy. Rupture of the uterus was seen four times. This is an incidence of 1 in 1500 deliveries. One time it was noted when a caesarean section was done after a failed forceps and failed version and extraction, once after a breech extraction, once when an attempt was made to do a version and extraction on a premature dead fetus. All three of these were grande multiparae and resulted in hysterectomies. It was once seen in a nullipara which was delivered by caesarean section after a forceps trial. This lesion, as were all the others, was in the lower uterine segment, and as in this last case it was very minimal, it was closed and the uterus left in situ. This patient has not been seen by us afterwards. As can be noted, all these severe lesions could have been

prevented. We have not seen any rupture of the uterus in patients that had a previous caesarean section. We had 17 patients that had at least one vaginal delivery after a previous caesarean section.

Invagination of the uterus was seen once, after possibly too forceful traction on the cord. It was replaced immediately without any ill effects to the mother.

C. PUERPERAL STAGE

The incidence of pyrexia was 7.2 %. In 2.6 % endometritis was thought to be responsible for the pyrexia. Endometritis was diagnosed when the lochia was offensive or when no other cause could be detected for the fever. Fifty percent of these cases were operative deliveries and as only 22.7 % of all the deliveries were operative, it indicates that an operative delivery increases the possibility to develop pyrexia. As it was seen in 4.3 % of the low forceps deliveries, of which only 19 of the 50 cases had a labor duration of longer than 12 hours, we may suppose that the labor duration is not the only factor, but again that the operative delivery is of importance.

As we see so many patients with marked varicose veins of the lower extremities and vulva region, we could expect a higher percentage of patients with puerperal thrombosis or thrombo-phlebitis. We saw only 5 patients with a superficial mild thrombo-phlebitis of the superficial saphenous vein; two patients were seen who were thought to have a thrombotic process in the deeper saphenous vein. One of the latter two recovered promptly without therapy and left the hospital at the normal time, and the other received dicumarol. We had one patient who developed a pulmonary infarct after a caesarean section, which was done because of premature separation of the placenta. This patient recovered promptly with dicumarol. Thus, over the total deliveries, we may say that thrombosis and its complications are rather rare.

D. NEWBORNS

The total perinatal mortality, to which belong the antepartum deaths, the intrapartum deaths and the neonatal deaths was 3.2 % (see preventable deaths). To the neonatal deaths belong those infants that died before leaving the hospital. The total infant mortality was 1.6 %. For mature infants (these are the ones over 2500 grams) this was 0.6 %. For premature infants this figure is 19.1 %.

In the twin births, were 94 mature infants and 68 premature

infants according to weight. The neonatal mortality for the mature infants was 0 %, and for the prematures 11.5 %.

Maternal Mortality

There were seven patients either pregnant or in their puerperium that died during this seven-year period.

Two patients with eclampsia are described in the chapter of toxemias.

One patient not delivered, died of pulmonary edema and is also described in the chapter on toxemias.

One delivered patient died 5 weeks after delivery. This patient had an exploratory laparotomy and delivered two days after of a premature infant. On autopsy the diagnosis of carcinoma of the liver was confirmed.

One patient with severe sickle cell anemia with crisis died in her sixth month of pregnancy. No autopsy was permitted, the probable diagnosis of pulmonary infarction was made.

One patient, that was receiving neo-salvarsan for her latent (?) lues, died in her sixth month of pregnancy. On autopsy as major pathological findings encephalomacy and a pulmonary infarct were found.

One other death occurred during a laparotomy for ectopic pregnancy and is described in the chapter on abortions.

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- ⁵ NOVAK and RUBIN, *Integrated Gynecology* II: 216.

IV

THE TOXEMIAS OF PREGNANCY

Toxemia of pregnancy is a disease in pregnant women, characterized by edema, albuminuria and elevation of blood pressure, and in the end may result in eclampsia.

Any of the three basic symptoms may in itself be a manifestation of toxemia, but more often two or all three of the triad are present. The above definition already indicates, that there are two main groups:

- A. Occurrence of this triad of symptoms in normal women before the pregnancy, this is without a previous cardiovascular or renal disease.
- B. Occurrence of these symptoms in pregnant women with:
 - 1. Pre-existing hypertensive cardiovascular disease.
 - 2. Pre-existing renal disease (as nephrosclerosis, nephritis and pyelonephritis).

As to severity these two groups may be subdivided in:

- ad A. a. *Pre-eclampsia* The triad of symptoms manifesting itself after the 28th week of gestation.
- b. *Eclampsia*. The end result of a.
- ad B. c. *Superimposed Toxemia*. This is an aggravation of the existing disease — thus pre-eclampsia superimposed on hypertensive cardiovascular or renal disease.
- d. *No aggravation of the pre-existing disease*.
- c and d also may end with eclamptic-like symptoms.

There were 346 patients classified as having toxemia. As there were 6039 deliveries, this gives an incidence of 5.7 %. This is about the generally reported incidence, though lately some lower figures are reported ^{1 2 3}.

In Table I we see the classification of all the toxemia patients as to the previously mentioned groups, with the percentage of the total, and the incidence in all the deliveries.

TABLE I

Classification of the Toxemic Patients and Incidence

A. a. Pre-Eclampsia	247 = 71.4 %	incidence 4.10 %
b. Eclampsia (incl. B)	11 = 3.1 %	incidence 0.18 %
B. c. Superimposed Toxemia	27 = 7.8 %	incidence 0.44 %
d. Non-aggravated cardiovascular disease .	56 = 16.2 %	incidence 0.93 %
e. Renal Origin	5 = 1.5 %	incidence 0.08 %
Whole Group. 346 = 100 % incidence 5.73 %		

When we compare this classification with others, as for instance with a survey made by Hendelmann & Phillpott from Montreal of over 192 cases ² which also quotes Eastmann, we see that the distribution of the types of toxemia is about the same except for the superimposed toxemia group which is here slightly more frequent.

Table II shows the above-mentioned survey compared to our incidence:

TABLE II

	H. & P.	Eastmann	Aruba
A. 1. a. Hypertension not aggravated by pregnancy.	20.2 %	16.7 %	16.2 %
b. Hypertension aggravated by pregnancy.	4.1 %	4.0 %	7.8 %
2. Renal Disease	1.3 %	—	1.5 %
B. 1. Pre-Eclampsia	69.7 %	78.1 %	71.4 %
2. Eclampsia	4.8 %	1.2 %	3.1 %

The above-mentioned survey from Canada will concern mainly Caucasian people and here in Aruba they are in the minority. Still the incidences are about the same. But if we look for the occurrence of the toxemias in the three main groups of the Aruban population, we see the predominance of pre-eclampsia in the Aruban women and a definite lesser incidence in the Negro, etc. group compared as to the ratio of their respective deliveries. This is shown in Table III,

which gives the distribution of the toxemias in the population groups and the delivery ratio:

TABLE III
Occurrence of Toxemia in the Different Population Groups

	Aruban	Negro, etc.	White	Whole Group
Pre-eclampsia	71 %	24 %	5 %	= 100 %
Pre-existing Cardiovascular or Renal Disease	48 %	48 %	4 %	= 100 %
Eclampsia	80 %	20 %	0 %	= 100 %
Total Deliveries	42 %	51 %	7 %	= 100 %

We presume that the unbalanced diet in the Aruban group is of major importance in this condition. This is also seen by others ⁵. In general we have the impression that the Negro group has a more varied diet, as have the Caucasians. In all the local groups the food is often highly seasoned, possibly in the Aruban group still more. I cannot prove that the salt intake is high, but this might partly be eliminated by the perspiration due to the climate.

Anemia in pregnancy, which is here a rather frequent finding, seems not to be a causative factor, as the occurrence of anemia in this group is about the same as the overall incidence. This applies too for multiple pregnancies.

Insufficient information on the occurrence of polyhydramnios is available. But this, as no measurements of the amniotic fluid are taken, is a very subjective opinion and thus has no comparable value. On reviewing the toxemia group, two patients with apparently more marked polyhydramnios were seen.

Premature separation of the placenta, as is well known, is in our group of toxemia patients also more frequent than in non-toxemic women.

The most impressive finding is the perinatal mortality. As only 5.7 % of all the newborns are from toxemic mothers, it is responsible for 19.4 % of the uncorrected perinatal mortality.

Table IV gives the incidence of the above findings for the total deliveries and for the toxemia group:

TABLE IV
Responsibility percentage of toxemia to some observations

	All Deliveries	Toxemia	Percent of Total
Newborns	6124	352	5.7 %
Perinatal Mortality	201 = 3.2 %	40 = 11.3 %	19.4 %
Multiple Pregnancies	83 = 1.4 %	6 = 1.7 %	7.2 %
Premature Separation of Placenta	74 = 1.3 %	25 = 7.2 %	33.7 %
Anemia	525 = 8.7 %	32 = 9.3 %	6.0 %

As expected, the perinatal mortality is much higher when there is a pre-existing cardiovascular or renal disease in the mother and of course too when the toxemia ended in eclampsia (Table V).

TABLE V
The Incidence of Occurrence of the Perinatal Mortality in Different toxemia Groups

	Newborns	Perinatal Mortality	Percentage
Pre-Eclampsia	247	17	6.7 %
Pre-Existing Cardiovascular or Renal disease	88	18	20.4 %
Eclampsia	11	5	45.4 %
Whole Group	346	40	11.3 %

Premature separation of the placenta (P.S.P.), which occurred in 7.2 % of these cases, is most frequent in the eclampsias and is about as frequent in the aggravated and non-aggravated cases of pre-existing hypertension (Table VI).

TABLE VI
The Occurrence of Premature Separation of the Placenta in the Toxemias

	Total Toxemias	P. S. P.	Percentage
Pre-Eclampsia	247	14	5.6 %
Non-Aggravated Hypertension . .	56	6	10.7 %
Superimposed Toxemia	27	3	11.1 %
Eclampsia	11	2	18.1 %
Renal Disease	5	—	—
Whole Group	346	25	7.2 %

Treatment

As previously mentioned, all patients on their first visit to the Obstetrical Clinic are given a pamphlet with general hygienic measures and advice as to diet etc. explained in it. All patients are urged to decrease the salt intake in the third trimester of the pregnancy. If signs of impending toxemia occur, strict salt-free diet is advised and if excessive weight gain and/or edema is present, ammonium chloride grains XXX (= 2 gm.) three times a day for five days is given. Depending on the symptoms, they are told to return to the clinic, at least within one week. If no satisfactory results, or other signs warrant it, these patients are promptly admitted to the hospital. There the distance from and the transportation to the hospital for many patients is a major objection, we admit those more readily. They are placed on routine orders that read:

1. Confine to bed. Mouth gag and oxygen apparatus available in room.
2. High protein salt-free diet. Limit fluids to previous day's output.
3. Blood Pressure every 2 hours.
4. Chart intake and output.
5. Weight every morning.
6. Catheterized urinalysis for culture and routine.
7. Urinalysis (clean specimen) every second day.
8. Complete bloodcount.
9. Magnesium sulfate 1 ounce every 2nd day at 6 : 00 A.M.
10. Medication as ordered.

All other medication and laboratory work is done on an individual basis. When eclampsia seems to be impending, we use morphine sulfate in $\frac{1}{4}$ grain (16 mg.) doses, alternating with hypertonic (25 %) glucose solution and/or intramuscular 50 % magnesium sulfate, the time interval depending on the urinary output and blood pressure. Venasections are not done. During this time period, we have not used any of the newer hypotensive agents.

Oxygen is given when convulsions occur.

Anemias, as defined before, are corrected by blood transfusions. If it is apparent that there is progressive toxemia and a viable fetus, labor is induced by amnionotomy and in exceptional cases the pregnancy is terminated by Caesarean Section.

A. a. PRE-ECLAMPSIA

The pre-eclampsias or "true toxemias" are divided into two groups: the mild and the severe form. To the mild form belong those with a diastolic blood pressure from the patient's normal up to 100 m.m.Hg. and with none or only a trace of protein in the catheterized urine. All other cases belong to the second group.

Out of the 247 cases, 158 belonged to the mild and 89 to the severe form. The distribution of the two forms in the nulliparae and multiparae is seen in Table VII. Since for the former the age factor is important and for the latter the parity, the nulliparae are divided into ten-year age groups and the multiparae according to parity.

TABLE VII
Distribution of the Pre-Eclamptic Patients to Age or Parity

	Nulliparae			Multiparae			Total
	—19 y.	20—29 y.	30+y.	I—IV	V—IX	X +	
Mild	9	26	7	67	39	10	158 = 64 %
Severe	7	20	3	29	23	7	89 = 36 %
Total . . .	16	46	10	96	62	17	247 = 100 %

There were 72 nulliparae or 29 %. The approximate incidence for nulliparae in all the deliveries is 21 %. Thus, there is only a slight predominance for the nulliparae. Parae V and over make up 17 % of all the deliveries, but in this group 31 %.

There were six sets of twins, three in nulliparae and three in multiparae, all belonging to the mild form. Thus, there were 253 newborns. The perinatal mortality was 17, which is 6.7 %. In Table VIII, we see the distribution of this mortality for the mild and the severe form:

TABLE VIII
Perinatal Mortality in Pre-Eclampsia

	Newborns	Mortality	Percentage
Mild	164	7	4.1 %
Severe	89	10	11.2 %
Total	253	17	6.7 %

The uncorrected perinatal mortality for all newborns was 3.2 %. In pre-eclampsia this mortality is twice as high. For the mild pre-eclampsia only slightly increased but in the severe type it increased three to four times that of the overall mortality. These findings are about the same as seen in large hospitals ⁴.

The clinic attendance of our patients in general is good. Some reasons for late attendance are, for instance, "late" marriage of nulliparae and for the multiparae the distance from the hospital. The clinic attendance for the nulliparae and the multiparae is shown in Table IX.

TABLE IX
Clinic Attendance

	Nulliparae	Multiparae	Total
Good	64	143	207
Poor or very late . .	8	32	40
Whole Group . . .	72	175	247

Of the multiparae, 51 with previous viable pregnancies had a history of toxemia.

In Table X is shown the number of patients with pre-eclamptic toxemia, that had a history of "true" toxemia in previous pregnancies (between brackets is the number of eclampsias).

TABLE X
Number of Patients with a History of Previous "True" Toxemia

Parity	I—IV	V—IX	X +	Total
<i>Mild</i>				
Total	67	39	10	116
Previous History	15	19(5)	3	37(5)
<i>Severe</i>				
Total	29	23	7	59
Previous History	7(2)	5(1)	2(1)	14(4)

So we see that 29 % of the multiparae had a previous history of toxemia, nine of which with eclampsia. And as only less than 1/3 of the pre-eclamptics are nulliparae, which as generally accepted and seen should be the reverse, then we must consider two possibilities: First, that on more thorough examination a large percentage of these multiparae belong to Group "B", that is, those with a pre-existing cardiovascular or renal disease; or secondly that "true toxemia" is more frequent or the occurrence is as frequent as in the nulliparae. We believe that the latter is more likely, that is, these patients all have the symptoms of genuine toxemia as late onset of the toxemia triad and rapid regression of the symptoms post-partum. Also, as the proportion of Aruban women in this group is high, many of whom do not have a well balanced diet and eat highly seasoned food, we may presume that these people have possibly borderline organic functions and soon are thrown off balance by the often closely successive pregnancies.

Both theories might explain the high incidence of toxemia in the grande multiparae, as shown in Table XI.

TABLE XI

Incidence of Pre-Eclamptic Toxemia as to the Total Deliveries

Parity	0	I—IV	V +	Cases
All Deliveries	21 %	62 %	17 %	6039
True Toxemia	29 %	39 %	32 %	247

Premature separation of the placenta (P.S.P.), as a complication in this type of toxemia, occurred fourteen times. This is an incidence of 5.6 %. When we analyze the P.S.P. incidence in mild and severe pre-eclampsia and in toxemia with pre-existing disease, we notice a similar incidence of P.S.P. in severe pre-eclampsia and in toxemia with pre-existing disease (Table XII).

TABLE XII

Incidence of P.S.P. in Pre-Eclamptic Toxemia

	Nulliparae			Multiparae			Total
	Total	P.S.P.	Percentage	Total	P.S.P.	Percentage	
Mild. . .	42	2	4.7 %	116	3	2.5 %	3.1%
Severe . .	30	3	10 %	59	6	10.1 %	10.1%

Total patients with Pre-eclampsia	247 P.S.P. 14 = 5.6 %, compared to,
Total patients with Eclampsia	10 P.S.P. 2 = 20.2 % and
Total patients with pre-existing Cardiovascular and Renal diseases	88 P.S.P. 8 = 11 %

The perinatal mortality, which is always high when the pregnancy is complicated with premature separation of the placenta, was for these 14 pre-eclampsias with P.S.P. eight or 57 %.

Type of Delivery

Labor was induced by amniontomy 24 times (= 10 %), all with good result.

Caesarean Section six times of which four times elective for cephalopelvic disproportion. The other two because of P.S.P. Both resulted in neonatal death of the fetus.

Low-Forceps	40 ×
Mid-Forceps	8 ×
Breech Extraction	3 ×
Version & Extraction	2 ×
Spontaneous	188 ×

One patient developed pulmonary edema when treated in the hospital for severe pre-eclampsia. A description of this case is as follows:

Chart Number 61112. Patient was of Negro race and 34 years of age. Her parity was 7-0-0-6. First delivery at home uneventful and 5 deliveries in this hospital also uneventful with no signs of toxemia. She had only on one occasion a menstrual period after the last delivery. In her fourth month she had vaginal bleeding for three days. After this she was seen by us in the clinic. That time her blood pressure was 110/60, her weight 125 lbs., no protein in the urine. Except for anemia, no pathology was encountered. In her 31st week the blood pressure was 102/80, her weight

144 lbs. In her 34th week the blood pressure had risen to 160/90 and her weight to 155 lbs. This time the patient was admitted. After admission, the blood pressure fluctuated between systolic 180—150 and diastolic 100—90. The urinary output was decreased and contained one plus albumen. The hemoglobin was 7.8 gm. %, for which a blood transfusion (500 cc) was given. Five days after the admission, there was a sudden rise of the blood pressure to 190/110. She received intramuscular and oral papaverine, 2 cc of 50 % magnesium sulfate and 250 cc of 25 % glucose in distilled water. During this infusion she suddenly developed pulmonary edema. Eight days later, when the patient was again in better condition, labor was induced by amnionotomy and the patient delivered spontaneous of a 2100 gram living infant of 37 weeks. Ten days after delivery the blood pressure had returned to normal, the urine still contained a trace of albumen in a non-catheterized specimen. Later, on further examination, a defect of the atrial septum was suspected.

The explanation, as quoted by our internist, is probably, that improvement of the colloid osmotic pressure plus the additional osmotic effect of the hypertonic glucose solution had suddenly drawn so much edema fluid into the circulation that overloading of the left ventricle resulted. It demonstrates that in pre-eclampsia, where there might be some degeneration such as parenchymatous and fatty, one must be cautious not to overload the circulatory system.

Analysis of the Perinatal Mortality

A. Stillborn Infants

	Gestation	Weight	Ante-Intra-partum-Death		Severity	Description
1	32 w	3630 gm.		+	Severe	Congenital abn. *
2	40	2160 gm.	+		Mild	P.S.P. **
3	34	2040 gm.	+		Mild	P.S.P.
4	40	3390 gm.		+	Severe	Uterine Inertia
5	36	1800 gm.	+		Severe	P.S.P.
6	40	3600 gm.		+	Mild	Uterine Inertia
7	40	3800 gm.		+	Mild	Uterine Inertia
8	34	2250 gm.		+	Severe	P.S.P.
9	33	2040 gm.	+		Severe	Macerated
10	36	2250 gm.	+		Mild	P.S.P.
11	?	?		?	Severe	P.S.P.

The numbers 1—8 were all in nulliparae.

* fetus had anasarca and the abdomen had to be punctured before delivery could be accomplished.

** was the second of a set of double ovum twins and was macerated. The other infant, which own placenta was not prematurely separated was normal.

B. Neonatal Deaths

	Gestation	Weight	Type Delivery	Asphyxia	Time of Death	Severity	Diagnosis
1	36 w	1860 gm.	Spontaneous	No	9 Hrs.	Severe	Hemorrhagic Diathesis
2	40	3480 gm.	Low Forceps	+	24 Hrs.	Mild	Bilat. Atelec.
3	39	2070 gm.	Spontaneous	No	13 Hrs.	Mild	Atelectasis ?
4	40	3150 gm.	Spontaneous	+	?	Mild	Mongoloid
5	37	2910 gm.	C.S.	+	15 Min.	Severe	P.S.P. in mother
6	42	3810 gm.	C.S.	+	17 Hrs.	Mild	P.S.P. + Prolapse of cord.

Autopsy was done only on numbers 1 and 2.

Except for number 1 in the stillborn group, no other responsible entity for the perinatal mortality can be suggested than maternal illness.

This leaves a loss of 16 in 253 newborns or 6.32 %.

B. TOXEMIA AND PRE-EXISTING CARDIOVASCULAR OR RENAL DISEASE

There were a total of 87 patients belonging to this group. This is 1.4 % of all deliveries and 25 % of the total toxemia group.

As might be expected, this condition occurs more in the older women and therefore more grande multiparae. As not sufficient information is available, especially before 1948, since many women delivered outside this hospital before that time, we cannot tell that the successive pregnancies had any influence on this condition nor whether the patient had before 1948 an aggravated or a non-aggravated hypertension in their pregnancy. We only know that two of the women had a prepartum and one a post-partum eclampsia.

In table XIII we see the incidence of non-aggravated and aggravated hypertensive cardiovascular disease and renal disease according to parity:

TABLE XIII

Incidence of Toxemia in Pre-existing Cardiovascular — Renal Disease

Parity	0	I—IV	V—IX	X +	Unknown	Tot. Percentage	
Non-Aggravated. . .	5	17	27	5	1	55	63.3 %
Aggravated	1	9	14	2	1	27	31.0 %
Renal	1	3	1	—	—	5	5.7 %
Whole Group. . .	7	29	42	7	2	87	100 %

We see here that more than half of these patients had five or more children.

In Table XIV we see the incidence as compared to all deliveries and to "true" toxemia:

TABLE XIV

Comparison of group A and B as to the Total Deliveries

Parity	0	I—IV	V +	
All Deliveries	21 %	62 %	17 %	
"True" Toxemia = A. . .	29 %	39 %	32 %	
Group B	8 %	33 %	56 %	+ two unknown parities

Also the nulliparae were all older (1×28 years, 2×29 , 1×34 , 2×40 and 1×41 years). The total uncorrected perinatal mortality was 18 or 20.6 %.

Below is shown the distribution of the perinatal mortality in the different conditions:

	Stillborns	Neonatal Deaths	Total
Non-Aggravated Hypertensions	7	2	9
Aggravated Hypertensions . .	6	2	8
Renal Disease.	1	—	1
Whole Group.	14	4	18

In Table XV is shown the perinatal mortality incidence in the three subgroups:

TABLE XV
Perinatal Mortality in Toxemia with Pre-existing Cardiovascular-Renal Disease

	Total Cases	Mortality	Percentage
Non-Aggravated Hypertension . . .	55	9	16.3 %
Aggravated Hypertension	27	8	29.6 %
Renal Disease	5	1	20 %
Whole Group	87	18	20.6 %

This clearly indicates that a superimposed toxemia increases the fetal mortality markedly, as is also reported by others ³.

Premature separation of the placenta which occurred nine times in these 87 cases or in 10.3 % was responsible for nine of these deaths. Though this complication was about as frequent in the aggravated and non-aggravated cases, the mortality was 100 % when a superimposed toxemia did exist.

Table XVI gives the incidence of premature separation of the placenta (P.S.P.) and the mortality of the newborns:

TABLE XVI
Perinatal Mortality and P.S.P.

	Total Cases	P.S.P.	Mortality	Percentage
Non-Aggravated Hypertension .	55	6=10.9%	3	50 %
Aggravated Hypertension . . .	27	3=11.1%	3	100 %
Renal Disease	5	—	—	—
Whole Group	87	9=10.3%	6	66.6%

As it is important to know the mortality of the newborns in mild cases and in severe cases of pre-existing cardiovascular hypertension, I divided these cases in two groups:

1. The mild form, to which belong all those with a diastolic blood pressure of below 110.

2. The severe form, to which belong those cases that had as bed patients for at least several successive readings a diastolic blood pressure of 110 or higher.

This diastolic blood pressure of 110 is arbitrary.

When we compare these two groups, we see that in both the aggravated and non-aggravated cases the mortality is increased in the severe form.

Table XVII gives the incidence of the newborn mortality in the mild and in the severe form:

TABLE XVII
Perinatal Mortality according to Severity of Toxemia

Form	Non-Aggravated	Mortality	Aggravated	Mortality
Mild	46	7 = 15.6 %	12	3 = 25 %
Severe	9	2 = 22.2 %	15	5 = 33.3 %
Whole Group . .	55	9 = 16.3 %	27	8 = 29.6 %

Analysis of the Perinatal Deaths

Stillbirths

	Gestation	Weight	a.p. *	i.p. *	Delivery	Description
1	36	?	+		Vers. & Extr.	P.S.P. + Placenta Previa
2	32	1240 gm.	+		Spont.	P.S.P.
3	39	?	+		Spont.	Macerated, previous Caesarean Sec.
4	40	2700 gm.	+		Spont.	Macerated
5	38	1700 gm.	+		Spont.	P.S.P.
6	36	?	+		Spont.	P.S.P.
7	32	1440 gm.	+		Spont.	P.S.P.
8	39	1470 gm.	+		Spont.	Macerated
9	26	?	?		Spont.	Severe Superimposed Toxemia
10	33	1470 gm.	+		Spont.	Severe Superimposed Toxemia
11	33	2340 gm.	+		Spont.	P.S.P. and hypofibrinemia
12	32	1710 gm.		+	Spont.	P.S.P.
13	30	870 gm.	+		Spont.	P.S.P. macerated
14	40 ?	2330 gm.		+	Spont.	Hydrocephalus

* a.p. means antepartum death and i.p. intrapartum death.

Numbers 1—7 belong to the non-aggravated, 8—13 to the aggravated hypertensions and 14 to the renal group.

Neonatal Deaths

	Gestation	Weight	Delivery	Asphyxia	Life	Description
1	40 w	1920 gm.	Low Forceps	+	2 min.	Asphyxia, no autopsy
2	40	3000 gm.	Spont.	—	23 days	Autopsy: partial obstructed ileum
3	28	450 gm.	C.S.	—	3 Hrs.	Severe superimposed toxemia with retinopathy
4	40	3570 gm.	Verx. & Extr.	+	4 Hrs.	No autopsy, atelectasis?

Numbers 1 and 2 belong to the non-aggravated and 3 and 4 to the aggravated group.

Numbers 14 of the stillborns and number 2 of the neonatal deaths are probably not caused by the toxemia. This will reduce the death rate as shown in Table XVIII.

TABLE XVIII
Corrected Perinatal Mortality for Group B

	Total Cases	Corrected Mortality
Non-Aggravated Hypertension	55	8 = 14.5 %
Aggravated Hypertension	27	8 = 29 %
Renal Disease	5	0 = 0 %
Whole Group	87	16 = 18.1 %

There were no multiple pregnancies, and no polyhydramnios was recorded. Labor was induced by rupturing of the membranes 21 times and with good result.

Type of delivery:

Caesarean Section

1 at 28 weeks in a patient with severe superimposed toxemia with retinopathy.
Neonatal death of infant.

Version & Extraction	2 × Once combined with placenta previa and p.s.p. with stillborn fetus, and once after a failed high forceps resulting in neonatal death of infant.
Mid-Forceps	5 ×
Low-Forceps	5 × One neonatal death in premature infant.
Spontaneous	74 × Thirteen stillborn fetuses.

In this thesis only those cases are surveyed that actually delivered in this hospital. No consideration is given to those that were seen by us, but delivered elsewhere. There is, however, one case with ante-partum death of the mother, that should be mentioned here. The following is a brief summary of this case, which belongs to group B:

Case number 35363. This patient was an Aruban woman of 40 years of age. She was first seen in the 6th month of her fifth pregnancy. The blood pressure was then 190/110 and patient stated that she did not feel well. There was no ankle edema. Patient refused hospitalization. She returned in her 8th month of this pregnancy with acute pulmonary edema. The blood pressure was 190/130 and there was marked ankle edema. The fetal heart sounds were present on admission. The patient died 24 hours after admission.

The fetal heart sounds were not audible several hours before the patient expired. This patient had a history of mild hypertension, but no sufficient information of her status before this pregnancy is known.

The main finding at autopsy was, besides the lungs, a hypertrophy of the left ventricular wall. The report on the other organs is not available. I might add that on the first visit no albumen was present in the urine; when in the hospital it was + + + + with a rare granular cast.

We might place this patient in group B with pre-existing cardiovascular hypertension aggravated during the pregnancy.

ECLAMPSIA

There were eleven patients with eclampsia delivered in this hospital in this seven year period. This is 3.1 % of all the toxemias and an incidence of 0.18 % of all the deliveries.

Six of these were a result of true pre-eclampsia, four of aggravated hypertension and one of renal disease.

When we add these to the previously reported cases, we see the following incidence of eclampsia in these groups:

	Total	Eclampsia	Incidence
Aggravated Hypertension	31	4	12.9 %
Renal Disease	6	1	16.6 %
Pre-Eclampsia	253	6	2.3 %
Non-Aggravated Hypertension	55	—	0 %
Whole Group	345	11	3.1 %

The maternal mortality was 18.1 %, or two cases, which is also the total maternal mortality for all delivered patients or 0.03 % in 6039 deliveries. The perinatal mortality was 45.4 %. There were three stillborns and two neonatal deaths.

There were five multiparae and six nulliparae. Five of the eclampsias resulting from true toxemia were in nulliparae.

Eight of these patients were Aruban and three belonged to the Negro group. Here we see again the predominance of toxemia in the Arubans.

Four of the eleven had no prenatal care, of which one was a nullipara. The convulsions occurred nine times ante-partum and twice post-partum.

Below is a brief description of the maternal deaths:

- 1) 42833. Aruban, age 28, parity 7-0-1-5. History: The 5th delivery was at home with post-partum eclampsia, the 6th in this hospital. At that time there was no elevated blood pressure, but there was albumen in the urine and she delivered a stillborn child. During this recent pregnancy, the patient attended the clinic regularly. The initial blood pressure was 140/70, later it was found to be normal and in the eighth month did rise again to 130/80, and marked edema was present. The patient was advised to remain in the hospital but she refused. At term she returned and had a precipitate delivery one hour after hospitalization. The blood pressure was 180/110. Eleven hours after delivery the patient had a convulsion after complaints of epigastric pain. A half hour after this a second convulsion occurred after which she became unconscious and expired 18 hours after this.
Autopsy: Brain: Large hemorrhage in area of encephalomalacia in the right posterior aspect.

Kidneys: Bilateral hydronephrosis with chronic glomerulonephritis.

- 2) 44774. Aruban, age 32 years, parity 10-0-0-9(?). No previous history and no prenatal visits. Pregnant for about 36 weeks. Admitted with complaints of epigastric pain. Had marked edema and the blood

pressure was 240/140, the temperature was 38.2° C. Three hours after admission she had a convulsion and became comatose. Twelve hours after, when she was still unconscious, she delivered a stillborn fetus of 4 lbs. 10 ozs. The patient expired 10 hours after the delivery. The blood pressure did remain high until a half hour before death. An autopsy was refused. The diagnosis of cerebral hemorrhage was made.

There was one case similar to the second death case, though not lethal for the mother. This patient also had no prenatal care and had a known cardiovascular hypertension. After admission in the seventh month she had two convulsions and later on signs of cerebral hemorrhage were found. She delivered a stillborn fetus.

One more case of eclampsia was seen by us during this time, but this patient did not deliver in this hospital. This patient had in her first pregnancy a severe pre-eclamptic toxemia and a post-partum psychosis. In her second pregnancy she suddenly developed a severe toxemia resulting in eclampsia. After this was well controlled, she developed such a severe psychosis that she had to be transferred elsewhere, where she delivered a living infant.

In conclusion, we see that the incidence of toxemia is the same as in other places. Pre-eclamptic toxemia and eclampsia are seen more in the Aruban women than in other races in Aruba.

In summarizing the clinic attendance, we see an increase of absenteeism correlating with the severity of the toxemia as is seen below.

15 % of our patients with mild Pre-eclampsia got poor or no clinic attendance. In the other toxemias these figures were:	
Severe Pre-eclampsia	20 %.
Non-Aggravated Cardiovascular Disease	16 %.
Aggravated Cardiovascular Disease	27 %.
Eclampsia	36 %.

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V

MALPRESENTATION

With malpresentation here are meant all cases where the fetal presentation was not a vertex, when the patient was admitted to the labor room. These are:

1. Breech presentations.
2. Transverse Lie.
3. Face, Brow and other abnormal head positions.
4. Compound presentations.

BREECH PRESENTATION

A breech may appear in one of the following forms:

- a. Frank breech; both hips flexed and both knees extended.
- b. Full or complete breech: both hips and knees flexed.
- c. Single or double footling: one or both hips and knees extended, with the foot presenting.
- d. Knee presentation: Also double or single, with hip extended and knee flexed, with the knee presenting.

Of these the frank breech is the most complicating form, as this position obstructs the mechanics of labor and as, especially in extraction, there is no presenting part which can be easily grasped.

We also have to distinguish between single and multiple pregnancies, since in the latter, though the mechanism is the same, the delivery of the aftercoming child is mostly more easily accomplished, with less chance to fetal trauma and anoxia.

Single Pregnancies

During this seven year period, there were 180 breech presentations in single-pregnant women. This is 2.9 % of all deliveries over this period and is close to the generally accepted incidence of 3 to 5 %¹.

No attempt to convert a breech presentation to vertex is made. As in many of the delivery records, no accurate description of the form of breech presentation had been made, we do not have the true incidence of the different forms of this malpresentation.

According to the delivery records, there were:

Frank Breech	20
Full or Complete Breech	36
Single or Double Footling	36
No Sufficient information	88
Breeches in Single Pregnancy	180

The total perinatal mortality was 25; this is an uncorrected mortality of 13.8 % as against 3.2 % in all the 6124 newborns.

If we subtract all births out of multiple pregnancies and the newborns which were in a malpresentation, then we have the uncorrected perinatal mortality for occiput presentations of 2.5 %. Thus there is a striking difference, which we also see in other surveys ^{1 2}.

In Table XIX is the uncorrected perinatal mortality for different weight groups compared with other larger series, namely The Chicago Lying-In Hospital ³ and The Kansas Medical Center ¹ with over 1000 and over 700 cases respectively:

TABLE XIX
Perinatal Mortality in Breech Presentation

	Chicago	Kansas	Aruba
Under 1000 gm.	96.3 %	94 %	83.3 %
1000—1500 gm.	65.2 %	64 %	60 %
1500—2500 gm.	18.2 %	22.4 %	36.8 %
2500—4000 gm.	2.3 %	5 %	6.6 %
4000 up.	0 %	23 %	7.1 %

In Table XX we see the incidence of the perinatal mortality for these weight groups:

TABLE XX
Incidence of Perinatal Mortality in Breech Presentation

	Total Cases	Intrapartum	Antepartum	Neonatal	Total Deaths
Under 1000 gm.	6	—	1	4	5
1000—1500 gm.	5	—	2	1	3
1500—2500 gm.	19	—	3	4	7
2500—4000 gm.	136	3	2	4	9
4000—up	14	—	—	1	1
Whole Group	180	3	8	14	25

The one non-viable stillborn fetus of which the mother had a strong anti-Rhesus agglutination is included only for completeness.

Summary of the Perinatal Deaths

Stillbirths (i.p. is intrapartum and a.p. is antepartum death).

	Weight	i.p.	a.p.	Delivery Type	Description
1	1230 gm.	—	+	Spontaneous	Premature separation of the placenta (P.S.P.).
2	1130 gm.	—	+	Extraction	Macerated hydrocephalic with omphalocele.
3	1750 gm.	—	+	Spontaneous	Macerated with 9 weeks antepartum death.
4	2500 gm.	—	+	Caesarean Sect.	P.S.P. and big cervical myoma.
5	2250 gm.	—	+	Extraction	Macerated with cord 3 × around the neck.
6	2470 gm.	—	+	Extraction	Macerated hydrocephalic 3 weeks a.p. death.
7	3320 gm.	—	+	Spontaneous	Fetal hydrops, Rh-antagonism.
8	3380 gm.	+	—	Extraction	Hydrocephalic (paracentesis capitis after intrapartum death).
9	3630 gm.	+	—	Extraction	Anasarca of fetus, gestation time of 36 wks. (The abdomen had to be punctured before delivery could be accomplished.)
10	3760 gm.	+	—	Extraction	Macerated, uterine inertia.

None of these stillbirths can be attributed to the malpresentation.

Neonatal Deaths

	Weight	Delivery	Life	Description
1	1200 gm.	Spontaneous	3 Hrs.	Polyhydramnios. No autopsy.
2	1660 gm.	Spontaneous	4 Hrs.	Premature rupture of membranes. Autopsy: Tentorium tear & atelectasis.
3	1970 gm.	Extraction	5 Days	Autopsy: Tentorium tear and subarachnoid bleeding.
4	2030 gm.	Extraction	12 Hrs.	Atelectasis? No autopsy.
5	2530 gm.	Spontaneous	5 Hrs.	Uncontrolled diabetes of mother. Prolapse of the cord and true knot in the cord. No autopsy.
6	2200 gm.	Spontaneous	3 Hrs.	Atelectasis. No autopsy.
7	2700 gm.	Spontaneous	2 Mins.	Eclampsia in mother. No autopsy.
8	3380 gm.	Precipitate + extraction	1 Hr.	Precipitate delivery till head, which was extended; cord 3 × around the neck. No autopsy.
9	3600 gm.	Extraction	$\frac{1}{2}$ Hr.	Delivered in occiput posterior. No autopsy.
10	4900 gm.	Extraction	3 Days	Uterine inertia. Autopsy: Tentorium tear.

The non-viable fetus (under 1000 mg.) are not included in this list.

As we do not have sufficient autopsy reports as to the cause of death, we must include all these, except possibly number 7, as caused by the breech delivery. If we do exclude this number seven, we have a neonatal death rate, caused by the breech delivery of 9 in 164 liveborn viable infants in single-pregnant women. This is 5.4 %. When we do include this case, the death rate is 6.0 %, as to the overall infant mortality of 1.60 %, thus about $4 \times$ as high.

In Table XXI we have the corrected death rate as compared to the corrected death rate of the previous mentioned surveys:

TABLE XXI
Corrected Neonatal Deaths in Breech Deliveries

	Chicago	Kansas	Aruba
Up till 1000 gm.	—	82 %	80 %
1000—1500 gm.	53.1 %	15 %	33.3 %
1500—2500 gm.	3.9 %	7 %	25 %
2500—4000 gm.	—	2.1 %	2.2 %
4000—up	—	5 %	7.1 %
or:			
1000 gm. $\frac{1}{7}$ up	3.2 %	4 %	5.5 %
1500 gm. $\frac{1}{7}$ up	1.4 %	3.5 %	4.9 %
2500 gm. $\frac{1}{7}$ up	0.9 %	2.2 %	2.7 %

The real remarkable difference in this is our higher death rate in the prematures above 1500 gm. This may be due because we have no autopsies on two of the four deaths.

In Table XXII we have the type of delivery for all liveborn viable infants (except number 7 of the neonatal deaths) and for the mature infants only, with the respective mortalities.

TABLE XXII
Type of Breech Delivery and Neonatal Mortality

	1000 gm. +		2500 gm. +	
	Total	Deaths	Total	Deaths
Spontaneous	87	4 = 4.4 %	75	1 = 1.3 %
Breech Extraction	37	2 = 5.4 %	33	1 = 3 %
Breech Extraction $\frac{1}{7}$ Piper Forceps	18	2 = 11.1 %	17	1 = 5.8 %
Precipitate	6	1 = 16.6 %	5	1 = 20 %
Caesarean Section	14	0 = 0 %	13	0 = 0 %
Whole Group	162	9 = 5.5 %	143	4 = 2.6 %

When we look at these results, we see that the high mortality of infants delivered by breech delivery is mainly caused by the death of the premature infant.

Of course there are many other factors that threaten the life of premature infants, but cerebral damage by sudden increased pressure and sudden release of this pressure on the aftercoming head will definitely be a major factor on these already vulnerable cerebrums. On the other hand, large infants have also an increased chance of cerebral damage, but by more direct trauma.

Episiotomy was done in most of the breech deliveries.

There were 35 primiparae in this single pregnancy group, this is 19.4 % as against 21 % in the total deliveries. Of these:

9 delivered by breech extraction combined with Piper forceps.

10 by breech extraction.

8 by spontaneous breech delivery.

8 by caesarean section.

There were no deaths in these attributed to the breech delivery.

Of the 15 caesarean sections performed, one was done because of cervical myoma, and one because of a uterus bicornis bicollis; the others were done for feto-pelvic disproportion.

Twenty-five of the 145 multiparae had, according to the history as given, a previous malpresentation, of which 22 × a breech, once a face and twice a transverse presentation.

There was one child with a torticollis, which later became asymptomatic without treatment, and one child which was delivered by breech extraction with a birthweight of 6 lbs., had a bilateral paralysis of arms and legs from which the legs improved slightly and the arms remained paralysed.

Multiple Pregnancies

In the multiple pregnancies group were 51 breech presentations. Of these 21 were the first coming and 30 the after coming infant.

There were five neonatal deaths:

1. Spontaneous breech delivery, 1460 grams, first coming, lived for three days. No autopsy. Diagnosis atelectasis.
2. The third of previable triplets, weight 450 grams.
3. Spontaneous breech delivery of previable infant, weight 600 grams.
4. Breech extraction, aftercoming infant, weight 1300 grams, lived for 5 hours.

5. Breech extraction, aftercoming, weight 1200 grams, lived 4 hours.

These all belong to the previable or very premature infants.

Table XXIII gives the type of delivery and the mortality for all infants over 1000 grams and for the mature infants only for these multiple births.

TABLE XXIII
Breech Deliveries in Multiple Pregnancies

A. First Coming Child	1000 + grams		2500 + grams	
	Total	Mortality	Total	Mortality
Spontaneous	16	1 = 6.2 %	8	0 = 0 %
Extraction	4	0 = 0 %	2	0 = 0 %
Caesarean Section	1	0 = 0 %	1	0 = 0 %
Whole Group	21	1 = 4.7 %	11	0 = 0 %
B. Aftercoming Child				
Spontaneous	11	0 = 0 %	3	0 = 0 %
Extraction	16	2 = 12.5 %	7	0 = 0 %
Caesarean Section	1	0 = 0 %	1	0 = 0 %
Whole Group	21	2 = 9.8 %	11	0 = 0 %

Thus the grand total of breech deliveries of living infants over 1000 grams is 212, with a corrected mortality of $9 + 3 = 12$, this is 5.6 %. When we include the corrected death case, the incidence is 6.1 % as against 2.5 % for vertex presentations.

The grand total of infants over 2500 grams is 166, with a corrected mortality of 4, this is 2.4 % and when we again include the "corrected case", the incidence is 3.0 %, as against 0.6 % for all mature infants. Though the numbers are small, we see in this that there certainly is an increased hazard for the infant when delivered as a breech. This already should indicate that the breech presentation is a malpresentation.

FACE PRESENTATION

There were 6 patients with the fetus in face presentation. This is an incidence of 1 in 1000 deliveries. This is a rather low incidence, when compared with other surveys. (Johns Hopkins Hospital 141 cases,

with an incidence of 1 in 468 ⁶, Bronx Hospital 45 cases with an incidence of 1 in 800 ⁴.) There was one neonatal death in this group. This is a mortality of 16.6 %, as compared to 11.4 % and 12.1 % respectively in the previously mentioned surveys. One nullipara had a mild generally contracted gynecoid pelvis; all the other pelvises were ample.

As to the birthweight of these infants, 4 were more than 4000 grams and the other two more than 2700 and 2800 grams respectively. Thus there were no prematures, but mostly large infants which is often seen in this presentation.

In four patients the membranes ruptured at complete dilatation, in one after onset of labor and in one the time of rupture is not known. This is against the opinion that premature rupture of the membranes causes this presentation. Three patients delivered spontaneously with the fetus in face presentation, one by a low forceps as face, one in a spontaneous vertex after manual correction, one by midforceps after manual correction to vertex and one by version and extraction.

Description of the Cases

	Parity	Labor	Weight	Delivery	Description
1	0	14 Hrs.	2880 gm.	Midforceps	Manual correction to vertex, contracted pelvis.
2	0	10 Hrs.	4020 gm.	Lowforceps	Delivered as face.
3	1	?	2790 gm.	Vers. & Extr.	Attempt to convert to vertex failed.
4	V	29 Hrs.	4440 gm.	Spontaneous	Neonatal death *
5	II	17 Hrs.	4080 gm.	Spontaneous	Manual correction from mentum posterior to vertex.
6	V	23 Hrs.	4260 gm.	Spontaneous	Delivered as face.

* Attempt to convert to vertex or to do version & extraction failed under ether anesthesia. (Patient delivered 1½ hours after this procedure spontaneously.) The infant expired 31 hours after delivery. No autopsy was performed.

BROW PRESENTATION

There were eight patients that were admitted to the labor room with the fetus in brow presentation. This is an incidence of 1 in 750 deliveries, which, in contrast to the face presentation is more

frequent than the incidence found in the Johns Hopkins Hospital ⁶. There the rate was 1 in 1489 deliveries, with a total of 44 cases.

All the pelvises were well ample.

There was only one nullipara in this group.

The membranes had ruptured in five cases at complete dilatation, two times intrapartum and in one case the time of rupture is not known.

There was one antepartum fetal death and one intrapartum fetal death. Thus the corrected mortality is 14.2 %. The corrected mortality in the Johns Hopkins survey is 25 %.

Type of Delivery

Spontaneous as face	2
Spontaneous as vertex	1
Mid Forceps	2
High Forceps	1
Version & Extraction	2

Total 8

Description of the Cases

	Parity	Labor	Weight	Delivery	Description
1	II	16 Hrs.	4500 gm.	Version & Extraction	
2	I	33 Hrs.	3990 gm.	Mid-Forceps	Manual correction to vertex.
3	II	20 Hrs.	3540 gm.	High-Forceps	Corrected to vertex with forceps after failed manual correction.
4	II	?	2940 gm.	Spontaneous	Stillborn macerated fetus. Spontaneous conversion to vertex.
5	IV	18 Hrs.	3510 gm.	Spontaneous	Spontaneous conversion to face.
	0	?	3840 gm.	Mid-Forceps	Manual correction to vertex with prolapse of the cord.
7	XIII	21 Hrs.	3510 gm.	Version and Extr.	*
8	V	15 Hrs.	3450 gm.	Spontaneous	Manual correction to face.

* This patient had no prenatal care, she was referred after long labor at home, where thymophysine was given. The brow presentation was converted to a vertex by not complete dilatation. The fetus died later intrapartum.

TRANSVERSE PRESENTATION

Single Pregnancies

Of the 27 fetuses in transverse presentation (including three shoulder presentations) that occurred in single pregnancies:

- 1 was previable
- 10 were premature infants
- 16 were mature infants. Of these mature infants one weighed over 4000 grams and one over 5000 grams.

These 27 cases represent an incidence of 1 in 220 deliveries, which is slightly more frequent than in a Baltimore report of 1 in 322 deliveries over 162 cases ⁶.

All patients were multiparae, of which in the mature group were:

- 4 in parity II
- 7 in parity III—V
- 5 in parity VI—IX.

In only 5 cases a possible cause could be detected. These were one time a complete placenta previa, two times questionable low insertion of the placenta and two times premature rupture of the membranes.

Three patients had a previous history of transverse presentation and were that time delivered by version and extraction; three had a history of previous breech presentations. One patient with an andro-gynecoid pelvis and a parity of 4-0-0-3 had twice a breech delivery and the third time a caesarean section, because of breech presentation, was performed. This fourth time she had premature labor with transverse presentation of the fetus, and was again delivered by caesarean section of a living premature infant. Another patient with an anthropoid contracted pelvis and a parity of 9-0-0-8 had twice before pregnancies with transverse presentation, of which she was delivered by version and extraction. All the other pelvis were described as ample. The uncorrected perinatal mortality was 8 or 30.7 %.

Of the ten premature infants, six were stillborn, of which five died antepartum on the remaining one insufficient information was available as to the time of death. This one was a 1800 grams fetus, that was delivered by breech extraction after external rotation.

In Table XXIV we have the type of delivery and the perinatal mortality for the premature infants:

TABLE XXIV
Type of Delivery of Premature Infants in Transverse Presentation

Delivery	Total	Mortality	Description
Internal Podalic Version and Extraction.	6	4	3 antepartum deaths and one neonatal death of a 600 gm. infant.
Spontaneous Breech	1	1	Antepartum death. External rotation.
Caesarean Section	3	1	Antepartum death. Premature rupture of membranes.
Breech Extraction	1	1	External rotation. Ante or intrapartum death.
Total	11	7	

There was one mortality in the mature group. This was an infant of 2850 gm. which was delivered by version and extraction and Piper forceps; it died three hours after this. There was a severe premature separation of the placenta in this case. No autopsy was performed.

Table XXV shows the type of delivery for the mature infants.

TABLE XXV
Type of Delivery of Mature Infants in Transverse Presentation

Delivery	Total	Description
Internal Podalic Version and Extraction .	7	One neonatal death.
Caesarean Section	3	Of which one a repeat elective C.S.
as Vertex	3	After external rotation.
as Breech	3	After external rotation.
Total	16	One Neonatal Death

Thus, it is difficult to come to an exact figure for the corrected perinatal mortality, as the one stillborn premature is not definitely caused by the presentation or the delivery, and the same might be said for

the neonatal death of the mature infant. But, if we consider these as caused by the presentation or delivery, the corrected mortality is 7.6 %. This is very favorable if we compare this with the 37.7 % in 322 cases in the Baltimore and 35.5 % in 131 cases for the Johns Hopkins group (5.7).

Multiple Pregnancies

In this group there were ten infants that were in a transverse presentation. They were all in the aftercoming twin. Five of these delivered as a vertex and five by version and extraction. Three of these were premature. There were no mortalities. The version and extraction were all done on mature infants. Thus, version and extraction was done 14 times on living infants, with only one neonatal death, which still might have been caused by a premature separation of the placenta.

¹ CALKINS, L. A., *Am. J. Obst. & Gynec.* 69: 977, 1955.

² SCHMITZ, H. E., SMITH, C. J., CLUMPNER, E. R. *Am. J., Obst. & Gyn.* 69: 984, 1955.

³ DIECKMANN, W. J., HARROD, J., *Am. J. Obst. & Gyn.* 70: 252, 1955.

⁴ POSNER, A. C. COHN, S., *Am. J. Obst. & Gyn.* 62: 592, 1951.

⁵ GAREIS, L. C., RITZENTHALER *Am. J. Obst. & Gyn.* 63: 583, 1952.

⁶ HELLMAN, L. M., EPPERSON, J. W. W., CONNALLY, F., *Am. J. Obst. & Gyn.* 59: 831, 1950.

⁷ HARRIS, B., EPPERSON, J. W. W. *Am. J. Obst. & Gyn.* 59: 1105, 1950.

VI

ANTE-NATAL BLEEDING IN LATE PREGNANCY

All cases listed here were hospitalized patients or were admitted because of bleeding.

Causes of the bleeding:

Premature Separation of the Placenta	73
Placenta Previa	16
Placenta Circumvallata.	2
Cervical Lesions.	15
Other Lesions.	3
Unknown.	6
Total.	115

PREMATURE SEPARATION OF THE NORMAL IMPLANTED PLACENTA

These 73 cases give an incidence of 1 in 81 deliveries. This is very frequent in comparison to 1 in 250 found by Eadie and Randall¹ and 1 in 161 found by Gabriels².

There was one case wherein the premature separation was combined with placenta previa and placenta circumvallata. This one is not included in these 73 cases.

Co-existing toxemia was present in 25 cases, which is over 33 %. This high incidence is generally seen and is reported even up to 69 % by Dieckmann. Anemia was present during the pregnancies in sixteen cases. This represents 21.3 % of the cases as against 8.7 % in the total deliveries here. This would indicate that anemia during the pregnancy might be of influence in this condition.

There were no maternal mortalities, but the uncorrected perinatal mortality was 32 out of 75, which is 42 %. There was one set of triplets in this group. Also one set of twins, but the separation of the placenta was only in the aftercoming twin. This incidence of 42 % is about the same as found by Eadie and Randall¹.

According to the degree of separation there were:

Mild or Marginal.	22
Partial.	41
Complete	10
Total	73

It is possible that there was a number of cases with rupture of the marginal sinus ⁵ in the first group, but no such diagnosis has been made.

Table XXVI gives the type of delivery and the death of the newborns for the different degrees of separation: (s.b. is stillborn, n.d. is neonatal death).

TABLE XXVI
Premature Separation of the Placenta and Perinatal Mortality

Delivery	Mild			Partial			Complete		
	Total	s.b.	n.d.	Total	s.b.	n.d.	Total	s.b.	n.d.
Spontaneous Vertex. . .	14	—	1	28	9	3	9	9	—
Spontaneous Breech. . .	1	—	—	—	—	—	—	—	—
Low Forceps.	2	—	—	2	1	—	—	—	—
Mid-Forceps	3	—	—	1	—	—	—	—	—
Breech Extraction . . .	3	—	2	2	—	—	—	—	—
Caesarean Section . . .	—	—	—	8	1	4	—	—	—
Version & Extraction.	—	—	—	1	—	—	1	1	—
Whole Group	23	—	3	42	11	7	10	10	—

The three deaths in the mild group were all previable infants, belonging to a set of triplets. In the group with partial separation was also one previable fetus, which was stillborn, with death before the onset of bleeding and in which the mother had a severe superimposed toxemia.

It is seen that the more the separation, the worse the outcome for the fetus, for in the mild group, there is a loss of 3 out of 23 births (this is 12 %), in the partial, there are 19 out of 42 (this is 45 %) and in the group with complete separation there is a 100 % fetal loss.

In Table XXVII we have the perinatal death for the different weight groups:

TABLE XXVII
Perinatal Mortality in Weight Groups

	Total	s.b.	n.d.	Perinatal Deaths
....—1000 gm. . .	6	1	4	5 = 83 %
1000—2500 gm. . .	34	15	4	19 = 55 %
2500— up gm. . .	35	5	3	8 = 22 %
Whole Group . . .	75	21	11	32 = 42 %

We see here that there is a large group of premature infants which of course also increases the fetal mortality. But most of the loss is due to stillbirths, for which the premature separation was directly responsible.

There were two patients with marked hypofibrinemia. The hypofibrinemia was noticed during the bleeding and there was no long-standing death of the fetuses. The fibrinogen values found were respectively 71.1 and 61 mg. % fibrinogen in the bloodplasma. Both patients were treated with numerous blood transfusions, as we had at that time no commercial fibrinogen preparations available. Both patients recovered.

There was one case that was diagnosed as placenta previa combined with premature separation of the placenta. This patient was hospitalized in the 35th week of her pregnancy because of vaginal bleeding and hypertension. Shortly after labor pains began, she suddenly delivered the placenta. The fetus which was stillborn was delivered by version and extraction under ether anesthesia. Most likely this was a case of prolapse of the placenta after a complete separation.

As to the onset of the separation, 40 were before and 20 during labor and for 14 it is not known.

PLACENTA PREVIA

The definition of placenta previa as given by McCormick ⁴ is:

when the placenta is attached below its normal site, that is, wholly or in part, to the lower uterine segment.

He also gives three varieties as is generally done, but does not state any specific dilatation of the cervix as is done by other writers.

1. Marginalis — The placenta's lower margin is just at the internal os.
2. Partialis — The placenta only partially covers the internal os.
3. Centralis — The placenta completely covers the internal os.

According to these definitions, a central placenta previa may become a partial placenta previa when the dilatation of the cervix progresses. In the cases surveyed here, no specific dilatation has been stated, and the diagnosis of the three varieties is being made according to McCormick requirements.

There were 16 cases of placenta previa. This is an incidence of 1 in 326 deliveries. Of these, 9 were marginal, 4 partial and 3 complete placenta previa. The total perinatal mortality was 12.5 %. There were two neonatal deaths, both delivered by Caesarean Section and both premature. There were no maternal mortalities.

The newborn mortality is quite favorable, compared to a survey by Eadie and Randall ¹. They found an incidence of placenta previa of 1 in 200 deliveries (131 cases) and a mortality of 43.2 %.

All patients except one were multiparae. There was one patient with a combination of placenta previa, placenta circumvallata and premature separation of the placenta. She delivered spontaneously an infant of 980 gm. that survived. This patient had no prenatal care and also had a severe toxemia.

Caesarean section was done only when, after the membranes were ruptured, the bleeding continued and no active labor began, or, when the placenta previa was complete.

The type of delivery for all cases is shown below:

	Marginal	Partial	Complete
Caesarean Section	1	1 (1 n.d.)	3 (1 n.d.)
spontaneous	6	3	—
Mid-forceps	1	—	—
Vers. & extraction.	1	—	—
Whole Group	9	4	3

As is seen the two neonatal deaths happened to be in the caesarean section group.

PLACENTA CIRCUMVALLATA

There were only two cases recorded of placenta circumvallata. This would be a incidence of 1 in 3000 deliveries, which is very rare. Usually the incidence is thought to be 1 in 300 to 500 deliveries according to Torpin³. But as the description of the placentae in general has been inadequate, the incidence especial in the milder form will be higher.

The other types of ante-natal bleeding were serious enough that the patient had to be admitted to the hospital, and all occurred after the 28th week of the pregnancy. Most of these were marked erosions of the cervix. For the six cases where no cause could be detected even after delivery, rupture of the marginal sinus might have been a likely cause⁵.

References

- ¹ EADIE, F. S., RANDALL, J. H., *Obst. & Gynec.* 3: 11, 1954 (as surveyed in *Obst. & Gynec. Survey* 9: 819, 1954).
- ² GABRIELS, A. C. *Obst. & Gynec.* 5: 254, 1955.
- ³ TORPIN, R., *Obst. & Gynec.* 6: 277, 1955.
- ⁴ MCCORMICK, C. O., *Textbook on the Pathology of Labor, the Puerperium and the Newborn.* 1947.
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VII

PREMATURITY

There was a total of 339 liveborn infants weighing 2500 grams or less. There was one intrapartum stillborn fetus in this weight group which will be included here because of the onset of premature labor in that case. The stillborns with antepartum death will not be considered.

This makes a total of 340 infants, an incidence of 5.6 % in 6027 live born infants. This is a little less than seen in large clinics in the U.S.A. and Canada, where the incidence is between 5.9 and 6.5 % ^{1 2 3} in a predominantly White population.

In Table XXVIII we see the distribution of these premature infants the different races, with the overall distribution of the deliveries in parentheses and the incidence of prematurity.

TABLE XXVIII

Distribution and Incidence of Prematures According to Race

Arubans.	43 % (42 %)	incidence 5.7 %
Negroes, etc..	53 % (51 %)	incidence 5.8 %
Whites	3.5 % (7 %)	incidence 2.8 %

This shows a decrease in the White group of patients as against the overall incidence. We would expect a higher frequency in the Negro group, as it is generally noted that in these people the main weight of the newborns is lower than in White people and the newborns are often considered to be premature when weighing 5 lbs. 3 ozs. = 2350 grams ⁵. If we subtract the infants over this weight, we get an incidence for prematures in this Negro group of 4.2 %.

There were 65 neonatal deaths (including the previously mentioned stillbirth). This is an incidence of 19.1 % as against 0.6 % in the mature infants. These neonatal deaths are about 2/3 of all the (103) neonatal deaths in this seven-year period, which is also observed by others ³.

Sex Distribution of the Infants

It is generally observed that there is a predominance of female over male infants in prematures, a reversal of the grand total and also that the mortality of male premature infants exceeds that of the females ^{2 3}.

The grand total sex ratio of all infants in this hospital was: 100 males to 101 females. In this premature group the ratio is: 100 males to 120 females. Though this is not a reversal of the ratio, there are definitely more females.

Of the 64 neonatal deaths, 40 were males (this is 25 % of all males) and 22 were females (this is 11 % of all females). This shows that the death incidence for the males is twice as great as for females. In two infants the sex could not be determined because of major malformations.

Care of the Infants

When indicated, the premature infants are placed in an incubator or isolette with 4 liters of oxygen per minute, a temperature of 90° Fahrenheit and a humidity of 80—95 % and nothing per os for 24 hours. Vitamin K is given in a dosage of 5 mg. intramuscularly. On the fourth day after birth they receive multivitamins in drop form and at 4 weeks ferrous sulfate solution is administered. The premature infants are started on formula milk and, except for those infants that will probably be discharged at the same time as the mother, are kept on this. Lately we are more cautious with administering oxygen and vitamin K.

Analysis of Cases

Table XXIX gives the frequency of premature infants in groups of 500 grams and the neonatal death rate as compared to a report of the Chicago Lying-In Hospital ². The neonatal mortality in this report is the mortality within ten days and therefore, in our series I also excluded two cases that died respectively on the 14th day and at 3 weeks.

TABLE XXIX

Premature Infants and Neonatal Mortality

Weight	Aruba			Chicago		
	Total	Freq. %	N.D. %	Total	Freq. %	N.D. %
Under 1000 gm.	19	5.8 %	17 = 90 %	60	4.7 %	98 %
1000—1500 gm.	46	13.7 %	18 = 39.1 %	127	10.0 %	50 %
1500—2000 gm.	68	19.9 %	16 = 23.5 %	220	17.4 %	16.3 %
2000—2500 gm.	206	60.5 %	11 = 5.0 %	858	68.0 %	2.5 %
Whole Group	339	100 %	62 = 18.2 %	1265	100 %	14.9 %
Over 1000 gram n.d. = 14.0 %			Over 1000 gm. n.d. = 10.9%			

If we include the two infants that expired after 10 days, the first column would be:

under 1000 gm. n.d. 17 = 90 %
 1000—1500 gm. n.d. 19 = 41.3 %
 1500—2000 gm. n.d. 16 = 23.5 %
 2000—2500 gm. n.d. 12 = 5.8 %

Whole Group n.d. 64 = 18.8 %

n.d. over 1000 grams = 14.6 %

The time of death of the premature infants of over 1000 gm. is shown below:

Within 12 hours 23
 Within 12—24 hours 8
 Within 24—48 hours 6
 After 48 hours till the 10th day . . 8
 After 10 days 2

All Neonatal Deaths over 1000 gm. 47

Thus, 50 % of all viable infants died within twelve hours. In this group of neonatal deaths there were few autopsies, and the exact cause of death could not be diagnosed; but for the majority was, as in most of the prematures, pulmonary in origin or due to cerebral trauma.

Gestation Time

The gestation time as from the last menstrual period is very unreliable for several reasons but still gives interesting comparisons as to the neonatal deaths:

In 186 cases it should have been 36 weeks or more, with a neonatal death rate of 6.4 %.

In 154 cases it should have been less than 36 weeks, with a neonatal death rate of 34.4 %.

As seen in previous chapters, anemia was present in 8.6 % in our total group of delivered patients. But 78 of the 312 mothers that delivered prematurely had anemia (25 %). The anemia may be a sign of malnutrition and as is shown by others, malnutrition is an important cause in premature labor ².

In Table XXX we see the type of delivery with the respective neonatal deaths. It must, however, be realized that the comparison of the percentages of these neonatal deaths as to the type of delivery cannot be exact because so many other factors are involved in causing neonatal death.

TABLE XXX
Type of Delivery

Type	Total	N.D.	N.D. over 1000 gm. & Percentage	
Spontaneous	222	44	33	15.6 %
Low-Forceps	46	3	3	6.5 %
Mid-Forceps	7	—	—	0 %
High-Forceps	1	—	—	0 %
Spont. Breech	28	7	5	19.2 %
Breech Extraction . . .	16	6	4	28.5 %
Version & Extraction . .	5	1	—	0 %
Caesarean Section . . .	14	3	2	15.3 %
Whole Group	339	64	47	14.2 %

To arrive at the total of primary premature labor and delivery, that is without a likely cause, we have to delete those cases and conditions that probably contribute to prematurity. Though this has to be determined for each individual case, the following groups are mostly deleted:

A. Multiple Pregnancies

These include 72 infants (out of 42 pregnancies including two sets of triplets) with a total neonatal mortality of 12.

Table XXXI gives the distribution for the different weight groups.

TABLE XXXI

Multiple Premature Births and Neonatal Death

Weight	Total	Neonatal Death	%
Under 1000 gm.	5	5	100 %
1000—1500 gm.	18	6	33.3 %
1500—2000 gm.	18	0	0 %
2000—2500 gm.	31	1	3.2 %
Whole Group	72	12	17.7 %

B. Ante-Natal Bleeding

There were 25 cases with a neonatal mortality of 9 infants. This group includes premature separation of the placenta with or without toxemia, placenta previa, placenta circumvallata and unexplained bleeding. The occurrence is seen in Table XXXII.

TABLE XXXII

Ante-Natal Bleeding and Premature Births

Weight	Premat. Sép.		Placenta previa		Plac. Circum.		Unexpl. Bleeding	
	Total	N.D.	Total	N.D.	Total	N.D.	Total	N.D.
Under 1000	1	—	1	—	—	—	1	1
1000—1500 gm.	6	5	3	1	—	—	—	—
1500—2000 gm.	3	—	—	—	1	—	—	—
2000—2500 gm.	7	1	2	1	—	—	—	—
Total	17	6	6	2	1	0	1	1

C. Toxemia

There were 47 cases of toxemia, 16 of which were of cardiovascular-renal origin. Premature rupture of the membranes occurred 5 times in this group and labor was induced 10 times.

In Table XXXIII we see the incidence:

TABLE XXXIII
Toxemia and Premature Births

Weight	"True" Total	Toxemia N.D.	Cardio-Vasc. Total	Toxemia N.D.
Under 1000 gm. . . .	0	0	2	2
1000—1500 gm. . . .	0	0	2	1
1500—2000 gm. . . .	8	2	2	1
2000—2500 gm. . . .	23	1	10	0
Whole Group	31	3	16	4

D. Other Conditions

5 × elective caesarean section. All over 2000 gm.

2 × polyhydramnios (of which in one case, where there was over 5000 cc of amniotic fluid, the infant weighed over 2000 gm. The other infant was 1230 gm., had deformed extremities and died).

1 × sickle cell anemia and uterus didelphys. Infant weighed 2130 gm.

1 × sickle cell anemia. Very marked. Infant weighed 1220 gm.

1 × carcinoma of liver. Delivered after an exploratory-laparotomy. Weight 2500 gm.

2 × there existed a marked uterus myomatosus. Respective weights 1260 and 2400 gm.

12 × with one neonatal death.

E. Major Malformations

There were four infants with major malformations. They all died. Three weighed over 2000 and one over 1500 grams.

These, grouped together, are seen in Table XXXIV.

TABLE XXXIV
Possible Factors in Premature Delivery

Multiple Pregnancies . . .	72 = 21 %	of total prematures with n.d. of 12
Ante-Partum Bleeding . . .	25 = 7.3 %	of total prematures with n.d. of 9
Toxemia	47 = 13.8 %	of total prematures with n.d. of 7
Malformations	4 = 1.1 %	of total prematures with n.d. of 4
Other causes	12 = 3.5 %	of total prematures with n.d. of 1
Whole Group.	160 = 47 %	of total prematures with n.d. of 33

This of course does not mean that 47 % of all the premature births could have been prevented. We might have to subtract already, as outlined by Tiesche ⁴, the physiological premature incidence of, in our series, 5.6 % in the total toxemia and ante-natal bleeding group. These two groups, besides the multiple births make up the majority of the premature infants.

Of the 345 single births in the toxemias, an incidence of 5.6 % = 19 premature infants must be expected. As is seen, there were 47 infants, thus 28 infants were born prematurely caused by the toxemia factor in the mothers.

In the ante-natal bleeding group of 74 infants, the expected premature incidence would have been 4. As we had 25 infants in this group, 21 may have been born prematurely because of the ante-natal bleeding factor. But this leaves 340 less 160 = 180 infants without any apparent cause for the premature delivery by the mother. This is 53 % and with a neonatal mortality of 32 cases = 17.7 %.

Primary Prematurity

These 180 cases represents 3 % of all liveborn infants, as against 4 % found by Potter in the Chicago Lying-In Hospital ^{2a}.

For this group the racial distribution and incidence in all births was:

Arubans	94 (i.e. 52.3 %)	incidence	3.7 %
Negroes etc	80 (i.e. 44.4 %)	„	2.6 %
Whites	6 (i.e. 3.3 %)	„	1.4 %

We see that there are more Aruban infants in this group of primary premature infants than Negroes, as compared with the same incidence in the overall premature group.

The sex distribution was: males 89 and females 91, a ratio of 100 to 102 and thus close to the overall ratio of sexes.

The neonatal mortality was females 10 (11.1 % of all the females) and males 21 (21.3 %). This again indicates double the likelihood for the males not to survive the premature state. To this group also belongs the intrapartum stillbirth which will be quoted below. This fetal death is not included in the mentioned neonatal mortality.

In Table XXXV see the distribution of the infants in the different weight groups, with the respective mortalities within 10 days and frequency of occurrence in this premature group:

TABLE XXXV
Primary Premature Infants & Neonatal Mortality

Weight	Total	Freq. %	Neonatal Death	%
Under 1000 gm. . . .	9	5 %	9	100 %
1000—1500 gm. . . .	14	7.7 %	5	35.7 %
1500—2000 gm. . . .	36	20 %	12	33.3 %
2000—2500 gm. . . .	120	66.1 %	4	3.3 %
Whole Group	179	100 %	30	16.2 %

Neonatal Death of infants over 1000 grams = 12.3 %

Here there also was an infant that died 2 weeks after birth. This one is not included in the table, but would increase the total deaths for the weight group of 2000—2500 grams to 5 (4.1 %).

Gestation

Of these, 99 had a probable gestation of 36 weeks or more with a neonatal mortality of 2 % and 81 had a gestation of less than 36 weeks with a neonatal mortality of 22 %. There were 50 primigravidae (28 %); this is more than in the overall deliveries where the incidence was 21 %.

Age and parity of the mothers with primary prematurity

In Table XXXVI we see the distribution of primary prematurity according to different age groups and the overall age distribution of the delivered women. This shows that young mothers have a markedly higher chance of delivering a premature infant than older ones, and this mainly because of the primiparity as is seen in Table XXXVII.

TABLE XXXVI
Distribution of Primary Prematurity According to the Mothers Age

Age	Total	Age Distribution in Prim. Premat.	Overall Age Distribution	Incidence
..—19	35	19.5 %	7.1 %	1 in 12
20—29	89	49.6 %	51.7 %	1 in 35
30—39	53	29.6 %	55.9 %	1 in 40
40-up	2	1.1 %	5.2 %	1 in 156
Total	179	99.8 %	99.9 %	1 in 33

TABLE XXXVII

Distribution of Primary Premature Infants according to Age & Parity

Age	Parity 0	I—IV	V—	Total
..—19	24	11		35
20—29	20	63	6	89
30—39	6	33	14	53
40—..			2	2
Total	50	107	22	179
Percent of Total	28 %	60 %	12 %	100 %
Overall Percentage	21 %	62 %	17 %	100 %

Two of the mothers had two and four had one abortion before this first viable infant.

There were eleven women that had only premature infants (according to weight) of which four were of small build and weighed around 100 pounds. Premature rupture of the membranes occurred 27 times (= 15 %), in which group three infants died. Ninety-nine had intact membranes at onset of labor and for 61 it is not known.

Anemia, as stipulated before, was present in 32 cases (17 %). Thus, also in this primary group this is of great frequency.

A positive Kahn reaction was present in nine of the mothers with a neonatal loss of 4, but these deaths cannot definitely be attributed to this condition.

One of the mothers had acute pyelitis just before the onset of this premature labor. One had an alveolar abscess. One of them had a congenital vaginal septum. Two of them had small myomata. In one patient the vaginal wall was completely covered with condylomata acuminata. One had acute amebic colitis, one a previous caesarean section because of fetopelvic disproportion, and one had a secondary sterility. No abnormalities in the other 171 were described.

Neonatal Deaths

One infant had a +++ cord Kahn, and one previable infant, that was delivered by Version & Extraction, had a cord Kahn of +. Both mothers had no treatment. The three deaths that occurred after premature rupture of the membranes were:

1 Previa

1 Bronchopneumonia and Cerebral Hemorrhage. Autopsy.

1 Stillborn. Delivered by Caesarean Section after attempt to do Version & Extraction because of prolapsed arm.

In one other infant also a cerebral hemorrhage was found at autopsy. This had been a breech delivery. One other infant was found to have a congenital heart defect. At autopsy a pulmonary stenosis, a patent atrium septum and patent ductus Botalli were detected.

No autopsies were done on the other infants.

Sequellae

Retro-lental fibroplasia was diagnosed subsequently by our consultant eye specialist in three of these premature infants. In all three bilateral. This is an incidence of 3 in 265 premature infants that left the hospital (an incidence of 1 in 88). These three cases all occurred in the same year and all three belonged to the multiple births group.

1. Spontaneous birth. Weighed 1320 grams. Also has congenital deformities of feet and hands and a cleft palate.

2. Spontaneous birth. Weighed 1470 grams. This infant had received a blood transfusion. Number 1 and 2 are twins.

3. Spontaneous breech. Weighed 1590 grams. Aftercoming twin. The first coming infant of this set of twins has a strabismus and myopia.

Of the 27 infants with birth weights of 1500 grams (3 lbs. 5 ozs.) or less that left the hospital, all are still alive. In reviewing the clinic folders of these children, it was found that there were two that were mentally and physically retarded. Two others, a set of twins, had convulsions at later age.

This is not a complete follow-up, as many of these were not seen subsequently in the clinic after infancy. But these four cases with the two cases with retrolental fibroplasia constitute 26 % abnormalities in these small infants weighing less than 1500 grams.

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VIII

THE RHESUS FACTOR

All women attending the prenatal clinic for the initial visit are also typed for the presence or absence of the Rhesus factor, which is done here only against the most important and strongest antigen $Rh_0 = D$. If the patient is Rhesus negative, the husband's Rhesus factor is determined also.

Anti-Rhesus agglutinations are determined every month, qualitatively only. Since 1950 this has been done with the Slide test of Diamond and Abelson¹. According to Wiener, this test only determines the univalent antibodies (= blocking antibodies), but these are also the most important cause in developing erythroblastosis in the fetus and infant².

Until 1950, when there was no strong indication that the fetus of a Rhesus negative mother was affected by antibodies, the infant's hemoglobin, red cell count and the presence of nucleated red cells were only checked on the third post-natal day and, of course, further investigations were made when indicated. Since 1950 the cord blood is examined for this and at the same time for the presence of the Rhesus factor and agglutinins. Also the total bilirubin content, the bloodgroup and the Coomb's test are determined at the same time. The hemoglobin and bloodsmear are again re-examined on the third day. Lately we determine the total bilirubin also on the second and the third day.

Distribution of the Rhesus factor in the population

In the hospital laboratory 1400 employees from the Caribbean area (see introduction) were tested; most of them were males. Of these, 100 were Rhesus negative (7.1 %).

Of the North-American and European employees, also most of them male, 377 were tested of which 62 were Rhesus negative (16.4%).

As the people from the Caribbean area are mostly of Indian or Negro descent, in which races a low presence of the Rhesus factor is to be expected according to Wiener⁵, a fair amount of Caucasian mixture must be present in these people.

There was a total of 468 Rhesus negative women that delivered after the 28th week of gestation. This is 7.7 % of all the 6039 deliveries. As 93 % of all the deliveries were in the "local" group, this percentage is thus in accordance with the above findings.

Of the husbands, 364 were Rhesus positive, 60 were Rhesus negative and in 44 it had not been determined. This is a percentage of 14.1 of negative males, which is higher than expected and for which no plausible explanation can be found.

We also see here that 14 % of the Rhesus negative women have a Rhesus negative husband and 86 % a Rhesus positive husband.

In Table XXXVIII we see the distribution of these 468 Rhesus negative women in the three different population groups as compared with the total deliveries for these groups, and the incidence of the Rhesus negative factor. This shows that the incidence in the Caucasian group of women is lower than expected.

TABLE XXXVIII
Incidence of the Rhesus Negative Factor

	Rh Negative	Deliveries	Incidence
Arubans.	40.9 %	42 %	7.5 %
Negroes, etc..	47.6 %	51 %	7.2 %
Whites	11.5 %	7 %	12.7 %
All Groups	100 %	100 %	7.7 %

A positive anti-Rhesus agglutination one or more times during pregnancy was found 26 times and 16 times a doubtful and/or weak reaction was detected.

Of these women with a positive agglutination, all the husbands were known to be Rhesus positive.

Of these 42 women only 13 fetuses or infants were definitely affected by the agglutinins. Of five mothers (all multiparae) with a positive agglutination, it was found that the infant was Rhesus negative. In other cases where the infant was found not to be affected, the Rhesus factor of the infants is not known, because in the first years this was not determined. Of the 136 infants of Rhesus negative mothers that were checked routinely 101 were Rhesus positive and 35 Rhesus negative (25.7 %). In one infant where the mother in the fourth

month had a positive agglutination and the other months negatives, the infant had a positive Coomb's test, was Rhesus positive, but had none of the other symptoms of erythroblastosis. It is not known if any A-B-O antagonism existed in this case. Of all the remaining cases with a positive agglutination and an infant which was not affected, the cause of the positive agglutination could not be determined. Possibly these must be the results of previous sensitizations or false readings, or the very first sensitization in these multiparae.

The interpretation of a positive agglutination in positive and doubtful or weakly positive is difficult. Most of the doubtful cases were in the earlier years, when not all the specimens were checked for the presence of blocking antibodies; nor was the infant's blood as well examined.

Only two doubtful and two weak reactions were found by the present method. But that these reactions cannot be neglected is illustrated in the two following case histories:

- 1) nr. 48226. This pregnant woman had only once, in the fourth month of her gestation, a plus minus agglutination and after this in the remaining months there was a negative reaction five times. She delivered, at term, a stillborn infant, which was Rhesus positive and had a positive Coomb's test. Possibly another antagonism than the Rh₀-rh had been present here, as was most likely in the other case.
- 2) nr. 68295. This patient also had in her fourth month a plus minus anti-Rhesus agglutination and afterwards negative agglutination reactions. The infant was Rhesus negative and had a positive Coomb's test. But no signs of erythroblastosis could be detected.

There were two sets of twins in this group of Rhesus negative women. In both cases the father of these infants was also Rhesus negative.

The total perinatal mortality in Rhesus negative women with a Rhesus positive husband was eleven out of the 364 newborns. This is 3.0 % as compared to the overall total perinatal mortality of 3.2 %. In the group in which the Rhesus factor in the husband was not known, there were no fetal or infant deaths. Three of the eleven deaths were most likely not due to the Rhesus antagonism. They were all three in primiparae, with no positive agglutinations, and no signs of erythroblastosis could be found in these infants. One was a neonatal death of which the mother had eclampsia, one an antepartum death of unknown cause and one a neonatal death where at autopsy atelectasis was found.

This leaves eight deaths caused by erythroblastosis in 364 newborns.

Thus, the perinatal death rate caused by erythroblastosis is 2.2 %. This is 3,9 % of the total perinatal mortality of 201.

In Table XXXIX we see the incidence of erythroblastosis in the total births and in those of Rhesus negative women. In this table are also shown results quoted by Jacobs⁶ from Potter and Levine. We see that our incidence in all births is rather low as can be expected by the lower incidence of the Rhesus negative factor in the population, but that the incidence of erythroblastosis in Rhesus negative women is about as frequent, except for the infrequent ratio in Jacob's series for which he himself has no explanation.

TABLE XXXIX
Incidence of Erythroblastosis

Total Newbirths	6124
Total Rh Negative Women	468
Total Cases of Erythroblastosis	13
Total Incidence of Erythroblastosis in Rh Neg. Women	1 in 36
Total Incidence of Erythroblastosis in Rh Neg. Women with an Rh positive Husband	1 in 28
Total incidence of Erythroblastosis in all Births	1 in 471

	Aruba	Potter	Levine	Jacobs
Overall Incidence	1 in 471	1 in 252	1 in 150	1 in 419
Incidence in Rh Neg. Women	1 in 36	1 in 37	1 in 26	1 in 59

The thirteen cases of erythroblastosis, analysed according to the race of the mother, show the rare occurrence of this disease in the Negro infant in comparison with the White and Aruban infants. The rarity of this disease in Negro infants is also reported by Scott et al¹, who found an incidence of 0.45 cases per thousand Negro births of which still the majority was caused by an A-B-O antagonism.

In Table XL we have the incidence of erythroblastosis in the three population groups, in all births and in those of Rh negative women.

TABLE XL
Incidence of Erythroblastosis According to Race

	Arubans	Negroes, etc.	Whites
Total Births	2573	3122	429
Erythroblastosis Cases	10	1	2
Incidence of Erythroblastosis	1 in 257	1 in 3122	1 in 215
Rhesus negative Women	191	224	53
Incidence of erythroblastosis in Rh Neg. Women	1 in 19	1 in 224	1 in 26

This really shows the difference in the incidence of this disease in the different population groups.

Of the thirteen affected infants, six were stillborn, all with antepartum death. Two died in the neonatal period shortly after birth and both were markedly hydropic, and most likely could not have been saved. Of the eight living infants, two received an exchange blood transfusion and three a single or repeated single transfusions.

There was one child with a sub-clinical form of erythroblastosis. The Coomb's test in the cord blood was negative. Anemia developed only nine days after birth and the Coomb's test became positive seventeen days after birth.

According to Hsia ³ the average cord bilirubin levels in infants with erythroblastosis is more than double that of infants without this disease, and a level of 5 mg. % should be strongly suggestive of this disease (method of Hsia, Hsia and Gellis). With our method of total bilirubin determination (Hymans van den Bergh) we do not get such high levels as is seen in Table XLI. There it is shown that the value is just twice that of the non-affected infants. This indicates, nevertheless, that the cord blood does not give too much information as to the seriousness of this disease. In the years after this survey when routinely more frequent bilirubin determinations are made, we see the rapid increase of bilirubin content after birth, but still the low levels in the cord blood.

TABLE XLI

Total Bilirubin Levels in Cord Blood (in mg. %)

Rh Negative Mother plus:	Cases	Max.	Min.	Average
Neg. Father — Neg. Infant. . .	29	2.68	0.50	1.50
Pos. Father — Neg. Infant . . .	14	4.20	0.70	1.66
Pos. Infant in Multipara . . .	81	4.00	0.40	1.62
Positive Infant in Nullipara . .	17	2.60	0.70	1.40
Erythroblastosis in Infants. . .	6	5.80	1.00	2.68

As far as we know, and according to the clinic folders, no cases of kernicterus had occurred.

In Table XLII we see the parity of the mothers with affected infants or fetuses and the outcome for the fetus or infant.

TABLE XLII
Description According to Parity & Race

	Parity	Race	Outcome
1.	14-11-0-2	Aruban	Stillborn
2.	15-11-1-2	Aruban	Stillborn
3.	16-11-2-2	Aruban	Stillborn
These three cases had occurred in one patient. The eleven abortions may have been viable pregnancies, but is not as such described in the history			
4.	6-0-0-5	White	Simple Transfusion
5.	7-0-0-6	White	Exchange Transfusion
These two infants also belong to one mother. All her children are Rhesus positive. Her 5th infant, born before this survey, was affected too.			
6.	5-0-2-2	Aruban	Neonatal death. Hydrops of infant.
7.	6-0-3-2	Aruban	Neonatal death. Hydrops of infant.
These two infants also belong to the same mother.			
8.	2-0-0-1	Aruban	Stillborn
9.	4-0-1-2	Aruban	Stillborn
10.	5-0-2-2	Aruban	Exchange transfusion
These three infants also belong to one mother. Number three and later also number six and seven were normal and Rhesus negative.			
11.	6-0-0-5	Aruban	Simple Transfusion. No pregnancies after.
12.	5-1-0-3	Negro	Stillborn. No pregnancies after.
13.	4-0-0-3	Aruban	Transfusion. Sub-clinical form of erythroblastosis.
This mother's fifth infant, born after this survey study, died shortly after birth of a severe form of erythroblastosis.			

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IX

CONGENITAL MALFORMATIONS

There was a total of 153 infants with known malformations born in this seven-year period. This is 2.4 % of the total births.

This will not be an accurate figure, because there were not many autopsies and many minor abnormalities, as small hemangiomata, hypospadia, moles, etc. have not been recorded or have not been noticed.

A. MINOR MALFORMATIONS

These include all cases that have no influence on the life expectancy of the infant, and do not leave any marked deformity.

Table XLIII gives the type of minor malformation in total and for the different race groups.

TABLE XLIII
Minor Malformations

	Total	Negro, etc.	Aruban	White
1. Supernumerary Fingers and Toes	35	22	13	—
2. Talipes	27	13	13	1
3. Genua Recurvata	1	1	—	—
4. Malformed Hand	3	1	1	1
5. Ichthyosis	3	3	—	—
6. Hemangiomata	2	1	1	—
7. Fistula, lumbo-sacral region	1	1	—	—
8. Papilloma, ear region . .	5	2	2	1
9. Hypospadia	5	2	2	1
10. Papilloma, anal region . .	1	1	—	—
Total	83	47	32	4
Percentages for Races . .		57%	39%	4%
Overall Delivery Incidence		51%	42%	7%

There were 55 male and 28 female infants.

ad. 1. *Supernumerary Fingers with no other abnormalities*

In twenty-two cases, this consisted of a supernumerary bilateral fifth finger and in eleven a unilateral. They were all attached with a tiny stem, and they were removed in the nursery by simple ligation. Supernumerary thumbs and toes which have a broader base, are excised. They occurred once bilaterally and once unilaterally.

Supernumerary toes were seen once bilaterally and in combination with a unilateral extra digit, and twice unilaterally combined with bilateral extra digits.

This abnormality was seen 25 times in males and 10 times in females.

ad 2. *Talipes without other abnormalities*

Correcting plaster casts were applied by the surgeon before discharge from the hospital in all except one case which was very marked, with gratifying results. These were 16 males and 11 female infants.

No intra-uterine cause for this condition had been detected in the mothers. It occurred four times bilaterally.

Pes Equino Varus	10
Pes Calcaneus.	3
Pes Calcaneo Valgus.	9
Pes Calcaneo Varus	2
Not Described.	3
Total.	27

ad 3. *Genua Recurvata* as the single malformation was seen once in the female infant of a Para 8-5-0-2. Plaster casts were applied with excellent result. It was also seen once in a mongoloid infant, in which good results with this method were not obtained.

ad 4. *Malformed Hand*

Syndactily of 2nd and 3rd finger once. Absence of 2nd, 3rd and 4th finger and their metacarpals once. Both were male infants. Absence of numerous phalanges of feet and hands once in a premature female twin.

ad 5. *Ichthyosis* was seen twice in a very marked form in male infants of the same mother, and one other time in a milder form. All three recovered.

ad 6. *Hemangiomata* were only reported twice. These definitely do occur more often, but as most of these tumors grow at a later time,

they have not been noticed at discharge or were so minimal that they were not recorded.

ad 7. *Dermal sinus of the lumbo-sacral region* was seen once in a male infant and had been excised. It did end blindly.

ad 8. *Papillomas* of the ear region, most of them possibly as out-growths of the first branchial cleft region were noticed five times. No other abnormalities were present.

ad 9. *Hypospadia* in a more marked but still mild form, four times.

ad 10. *Rectal papilloma*. This was an interesting pathological specimen. This infant was one of a set of double ovum twins. The 2.5 cm. papilloma was excised and the pathological diagnosis of "cross section of intestine" was made. Three years later another excision had to be performed because of recurrence and the pathological diagnosis was "heterotopic rectal mucosa".

B. MAJOR MALFORMATIONS

These include all cases that are not compatible with life, or lessen the life expectancy, or leave marked deformity.

Table XLIV gives the type of anomaly, the occurrence in the different race groups, the average age of the mothers and sex of the infant.

TABLE XLIV
Major Malformations

		Negro, etc.	Aruban	White	Average age of mother	Male	Female	Unknown
1. Anencephalus . .	7	2	5	—	28	3	4	
2. Hydrocephalus . .	12	7	5	—	35	9	3	
3. Mongoloid . . .	7	3	4	—	37	1	6	
4. Harelip — Cleft .								
Palate	4	2	1	1	32	2	2	
5. Meningocele . .	2	—	1	1	28	1	1	
6. Microcephalic . .	3	—	2	1	22	1	2	
7. Heart Disease . .	22	7	12	3	31	15	7	
8. Others	14	5	8	1	30	8	4	2
Whole Group	71	26	38	7	30	40	29	2
Percentages		37%	53%	10%		55%	41%	4%

As the Aruban births constitute only 42 % of the total, as was seen before, this shows that there is an increased incidence of major malformations in this group of the population, less for the Negro group and about the same rate for the White group.

This also shows that the ratio of male to female infant is 100 to 70, as against an overall ratio of 100 to 101. If we add the infants with minor malformations (excluding hypospadia) there are 89 male and 57 female infants, a ratio of 100 to 60.

In our series at least we see that malformations occur more often in the male than in the female infant.

The incidence of major malformations in all births is 1.1 %. Murphy, quoted by Crenshaw ¹ found an incidence of 0.47 % in 10000 births, but in this report is not stated, what type of malformations were considered.

Of the deaths that occurred in this group, 33 belong to the overall perinatal mortalities of 201 in this seven-year period. This represents 16.4 %. Of these, 15 were stillbirths, this represents 15.3 % of the total of 98 stillbirths and 18 died in the neonatal period, as defined herein, this represents 17.6 % of the 103 neonatal deaths.

Furthermore, it is 34.2 % of the total mature infant deaths of 38 cases and 10.6 % of the total premature infant deaths.

In Table XLV we see the occurrence of the major malformations in four parity groups as to the age of the mothers and the overall expected deliveries in the age groups (see General Survey). In the

TABLE XLV
Occurrence of Major Malformations according to Age and Parity

Age	Para 0	Para I—IV	Para V—IX	Para X—Up	Para Un-known	Total	% of Total	Overall Age Distribution	Incidence
15—19	2	1				3	4.2%	7.1%	1 in 144
20—29	9	14	4			27	38.0%	51.7%	1 in 116
30—39	2	16	9	1	1	29	40.8%	35.9%	1 in 75
40—up	1	3	6	2		12	16.9%	5.2%	1 in 26
All Ages	14	34	19	3	1	71	99.9%	99.9%	1 in 86
Percent-age	20%	48%	27%	4%		99%			
overall %	21%	62%	17%						

last column is shown the incidence of major malformations in all deliveries. This clearly indicates that older women have a much greater chance of having congenitally malformed children than do younger ones.

We also see that the incidence in women with a parity of five or more also have an increased chance, but here other factors must be considered, as for instance the age, as many of the multiparae are older.

ad 1. *Anencephalus*

Five of these were stillborn and two died shortly after birth; the latter two were in 21-year-old primigravidae. One was in a patient, which received progesterone from her 3rd until the 7th month because of previous abortions and no living children. Another patient that had one abortion and also no children had years before a subtotal thyroidectomy with resulting hypofunction of the thyroid and the parathyroid glands. As is known, insufficient thyroid function in mothers does sometimes give malformed offspring⁴. The three other patients were grande multiparae, of which two were older than 35 years. They all three had abortions in their history, of which one of the two older ones had three and the other four. As far as the history is known on these patients, their other children were normal.

The incidence is 1 in 875 births (0.11 %). This is within the ranges of incidences reported².

ad 2. *Hydrocephalus*

These twelve cases include one set of twins, which were both affected and macerated stillborns. Of the total, nine were stillborn, two died and one is still alive. Nine of the mothers were over 30 years. Three of whom were over 40 years of age. Seven mothers had abortions previously, and they all have living normal children. One of these mothers previously had a major abnormal infant, which is described under 8. Two of the children had a spina bifida, one of which was combined with clubfeet. One also had an omphalocele and one a macroglossy.

The incidence in all births is 1 : 510. The same is found in the Mayo Clinics in 12,000 deliveries¹.

ad 3. *Mongoloids*

Of the seven mongoloid infants, two died, one shortly after birth, the other one after ten months; the latter also had, as is often seen in these malformations, an inter-ventricular septum defect ³. The average age of these mothers was 37 years. There was only one under 35 years of age. This was a 22-year-old multipara. There were two nulliparae, with ages of respectively 35 and 44 years one of whom had a marked uterus myomatosus. The infant of the 44-year-old nullipara also had *genua recurvata*, which had not improved greatly after plaster cast application.

These seven indicate an incidence of 1 in 875. This is about the occurrence generally seen ³.

ad 4. *Harelip and/or Cleft Palate*

As cleft palate might be a serious condition, mainly as a feeding problem, these infants are also included in this group with major malformations. These infants had no abnormality other than those mentioned.

One of these infants had a complete right, one a complete left and one a complete bilateral harelip, all three with a cleft palate.

There was one infant with only a cleft soft palate and no harelip. There was one 21-year-old nullipara in this group.

ad 5. *Meningocele*

These two cases had no other abnormalities. One died in infancy, and had the meningo (myelo?) cele in the lumbo-sacral region. In the other infant it was located in the thoraco-cervical region. This one was twice partly excised, and the infant is still alive and well.

The age of the mothers was respectively 36 and 21 years.

ad 6. *Microcephalic*

One in a young White nullipara in a sub-fertile marriage. This child died in her infancy.

One occurred in a young Aruban nullipara and is still alive and one in a young Aruban multipara, who has more afflicted children.

ad 7. *Heart Disease*

Of these 22 cases with congenital heart disease, nine were not diagnosed until after the baby was discharged from the hospital. This is well

recognized, since especially inter-ventricular septum defects are detected often only several weeks after birth.

Twelve of these infants died. On nine an autopsy has been performed, and in eight of these a malformation was detected, which was not compatible with prolonged life. The ninth had a large inter-auricular septal defect and hyaline membrane disease of the lungs.

There were two infants out of sets of twins, of which one was a single ovum twin. Their partners had no defects.

One of the infants also had talipes.

ad 8. *Other Malformations*

1. *Congenital atresia of the esophagus* with esophago-tracheal fistula at the level of the bifurcation of the trachea. Gastrostomy was performed. The infant died nine days after this procedure. Autopsy: atelectasis and aspiration pneumonia were found. The mother was a young Aruban nullipara.

2. *Atresia of rectum* in male. The mother was a young Aruban multipara. This child had a successful operation.

3. *Absence of abdominal wall muscles* in Aruban male. This child is still alive and wears an abdominal binder. He has had repeated urinary infections and has early hydronephrosis. The mother is a 27-year-old multipara.

4. *Osteogenesis imperfecta* in Negro male. This child had at birth numerous rib fractures and since then had repeated long bone fractures. The mother is a 35-year-old multipara.

5. *Hygroma*, multilocular type in White male. This was removed elsewhere, with resulting facial nerve damage. The mother is a 35-year-old para I.

6. *Defect of abdominal wall* with eventration of all viscera, also ectopia of bladder, no external sex organs and atresia ani, spina bifida and meningocele. Sex was undetermined. The mother was a young Aruban multipara. Neonatal death.

7. *Cyclops*. This infant also had meningocele of the skull, herniation of bowels through the umbilicus and absence of external sex organs. The mother was a 43-year-old Negro multipara.

8. *Microcephalic* with fusion defect of os maxilla and absence of nose. Also had supernumerary fingers, talipes and absence of external sex organs. On autopsy diagnosed as male. The mother was a 42-year-old Negro multipara.

9. *Absence of nose* with fusion defect of os maxillare, resulting in

bilateral complete harelip and split palatum. Plastic repair had been performed, but child died after several months. The mother was a 42-year-old Negro multipara. Sex: female.

10. *Inencephalus*. Though no autopsy had been performed, this infant had a text-book picture resemblance of this malformation. Sex: female. The mother was a 34-year-old Aruban multipara.

11. *Hypertelorism* in Aruban male. Mother was a young multipara.

12. *Partly absent femur*, with contracture of knee and talipes, in premature Negro male. Neonatal death of fetus. The mother was a 36-year-old multipara.

13. *Anasarca* in Aruban male. No blood group antagonism could be detected. The fetus had a gestation of 33 weeks and did weigh over 8 lbs. Was stillborn. The mother was a young Aruban nullipara.

14. *Premature closure of coronal suture* at right side, together with involvement of sphenoid bone and right orbital bone. Plastic repair elsewhere had been performed, by coronal craniectomy, with insertion of polyethylene plastic film over bone margins. This is an Aruban female. The mother is a 27-year-old multipara.

In none of the mothers was there any known abnormality or sickness except the one that had a thyroidectomy. The only more conclusive factors are the older age in a large percentage of these mothers, and that deformities occur slightly more often in the Aruban part of the population. As many of the Aruban people are more or less related to one other, in-breeding may have an influence on this.

As far as we know, there have been only two mothers who had more infants with major abnormalities.

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X

ANESTHESIA AND PREVENTABLE DEATHS

As had been seen before, the total perinatal mortality in this seven-year period was 201 in 6124 viable newborns or 3.28 %.

Antepartum	— This is the fetal death before onset of labor. . .	67
Intrapartum	— This is the fetal death after labor has been established and during delivery	31
Neonatal	— These are the deaths occurring after delivery and before the discharge from the hospital, thus will include a number of pediatric deaths	103
Perinatal Mortality		201

Of the neonatal deaths, 93 died within one week, of which 65 within 48 hours.

In Table XLVI we see the percentages of the perinatal mortalities with regard to the total newborns and the relation of its sub-groups.

TABLE XLVI
Total Perinatal Mortality

	% of Newborns	% of Perinatal Mortality
Antepartum Deaths. 67	1.09 %	33.33 %
Intrapartum Deaths 31	0.50 %	15.42 %
Neonatal Deaths 103	1.68 %	51.24 %
Perinatal Mortality 201	3.28 %	99.99 %

The anesthetic of choice in our clinic for obstetrical deliveries is intravenous 2.5 % sodium pentothal, except of course, when major relaxation is required when ether or nitrous oxide is used. For sedation during labor, we use seconal in a dosage of 200 mg. (3 grains) orally,

in the initial stage, and after labor is well established and with about 3 cm dilatation of the effaced cervix, demerol 100 mg. with scopolamin 0.4 mg. (1/150 grain) is given intramuscularly.

If necessary, the demerol dosage is repeated with or without scopolamin every three or four hours. No sedation is given within one hour of the anticipated delivery, unless the patient is too unco-operative, this in view of the fact that the combination of this drug with a general anesthetic accentuates the depressive effect on the baby⁷.

For caesarean section, we use local infiltration anesthesia and give sodium pentothal just before the hysterotomy is performed. Since 1953 we have also given sodium pentothal by drip infusion, which is started before the local anesthetic is given. This is a 0.01 % sodium pentothal in normal saline solution. It sedates the patient mildly, and we have not seen any marked untoward effect in the infants.

Demerol depresses the functions of the brain, the spinal cord and the lungs in the mother and also causes a definite respiratory depression in the fetus^{5 6 7}.

Intravenous sodium pentothal causes a tachycardiac but depresses the functions of the central nervous system and the lungs in the mother, and also depresses the functions of the central nervous system and the respiratory activity in the fetus^{5 6 7}.

But many favorable reports are written about the usefulness of demerol and sodium pentothal in obstetrics^{1 2 3 4}, though its limitations and dangers should be well understood, and it should only be given in well equipped hospitals and the patients should be watched throughout their labor and delivery. As for intravenous sodium pentothal, this has to be given by anesthetists well familiar with this type of anesthetic and the delivery performed by physicians familiar with forceps deliveries and resuscitations of newborn infants, as sodium pentothal is a very fast-acting anesthetic with, as reported, equal concentrations in mother and fetus in 10 to 12 minutes after the induction, with only a time interval of 5 to 6 minutes after induction with this anesthetic before an appreciable amount of sodium pentothal crosses the placenta into the fetal circulation⁷. Also the pre-delivery state of the parturient should be well cared for: as proper sedation as possible and an empty stomach, besides all other obstetrical requirements for an operative delivery.

Table XLVII shows the type of delivery for all newborns and the total of which were delivered with general anesthesia. There is also

in the same table the number of neonatal deaths and stillborn fetuses that died during or after a general anesthetic had been used.

TABLE XLVII

*Type of Delivery and General Anesthetic
Infant Loss with General Anesthesia*

Delivery	Total	Sod. Pent.	Deaths	Gas Anes.	Deaths	Spinal	Deaths
Spont. Vertex . .	4362	107	2	—	1 *	—	—
Spont. Breech . .	128	7	—	—	—	—	—
Low-Forceps. . .	1146	931	7	3	—	—	—
Mid-Forceps . . .	221	209	2	5	1	—	—
High-Forceps . .	11	9	—	2	—	—	—
Breech Extr.. . .	84	46	1	5	—	—	—
Vers. & Extr. . .	22	3	—	19	3	—	—
Caesarean Section	150	140	7	2	2	8	—
Whole Group . .	6124	1452	19	36	7	8	—

* * See number 5, page 78.

Local infiltration of the perineum with procaine, or pudendal block regional anesthesia had been used 937 times in conjunction with sodium pentothal anesthesia. The 212 low forceps deliveries without general anesthesia were performed under pudendal block, except for five cases that were done without any anesthesia. Pudendal block was also used for seven mid-forceps deliveries. The breech extractions without general anesthesia have mainly been assisted breech deliveries according to the description in the delivery records, as some extractions under anesthesia might have been, but were recorded as extraction.

Table II shows also that the operative delivery rate was 26.6 %. There were no maternal deaths caused by anesthesia.

In Table XLVIII are listed all the neonatal deaths and intra-partum deaths which occurred during sodium pentothal anesthesia, with type of delivery (1), birth weight (2), time of last doses of pre-delivery sedation = demerol mg. 100 (3), amount of sodium pentothal (4), time between induction and delivery (5), onset of respiration (6) in which sp. is spontaneous and res. is resuscitated, time of death of infant after delivery (7).

TABLE XLVIII

Description of Cases with Infant Loss after Sod. Pent. Anesthesia

	1	2	3	4	5	6	7	Description
1.	Spont.	2400 gm.	—	700 mg.	?	Sp.	12 hrs.	nr. 1 of set of twins, nr. 2 was in good condition.
2.	Low F.	1920 gm.	- 6 hrs.	375 mg.	4 min.	none	10 min.	No respirations, only heartbeats. This was a 42 week gestation in a 44-year-old nullipara with cardiovascular hypertension.
3.	Low F.	1230 gm.	- 3 hrs.	300 mg.	1 min.	Sp.	2 days	nr. 1 of set of twins, For nr. 2 see 5.
4.	Mid F.	2490 gm.	- 7 hrs.	1500 mg.	?	None	1 hr.	Cervical dystocia and secondary uterine inertia.
5.	Br. Ext.	1320 gm.	- 3 hrs.	300 mg.	6 min.	Sp.	5 hrs.	nr. 2 of set of twins.
6.	C.S.	1350 gm.	—	450 mg.	5 min.	Sp.	16 hrs.	Section done because of placenta previa with marked bleeding.
7.	C.S.	2220 gm.	—	?	4 min.	Sp.	26 hrs.	Same as for nr. 6.
8.	C.S.	2250 gm.	- 8 hrs.	?	5 min.	Res.	10 hrs.	Section done because of premature separation of the placenta.
9.	Low F.	2700 gm.	—	350 mg.	3 min.	None	10 min.	The fetus was in distress before delivery. Autopsy: Atelectasis.
10.	Low F.	3600 gm.	- 3 hrs.	350 mg.	?	Sp.	5 days	Autopsy: Congenital heart disease.
11.	Low F.	3480 gm.	- 7 hrs.	400 mg.	4 min.	Res.	22 hrs.	Autopsy: Atelectasis.
12.	Low F.	2910 gm.	- 1 hr.	450 mg.	3 min.	Res.	26 hrs.	Autopsy: Auricular septal defect and hyaline membrane disease. Postmature.
13.	Low F.	3370 gm.	?	?	?	Sp.	9 days	Autopsy: Bronchopneumonia.
14.	C.S.	2640 gm.	- 1 hr.	375 mg.	3 min.	Sp.	1 hr.	Autopsy: No findings. It was thought that the infant had a cong. heart block, but this was not investigated. Elective caesarean section.

	1	2	3	4	5	6	7	Description
15.	C.S.	3370 gm.	—	500 mg.	2 min.	Res.	2 hrs.	Elective c.s. because of uterus myomatosis in 44-year-old para I. Congenital heart disease in infant?
16.	C.S.	3810 gm.	- $\frac{1}{2}$ hr.	?	2 min.	Res.	32 hrs.	Premature separation of placenta, toxemia and prolapse of cord.
17.	C.S.	2910 gm.	- 4 hrs.	?	2 min.	Res.	1 min.	Premature separation of placenta in marked degree.
18.	Sp.	3660 gm.	—	1000 mg.	?	Sp.	—	Failed high-forceps. Delivered spontaneous 90 min. after induction of the anesthetic.
19.	Mid. F.	5100 gm.	—	800 mg.	45 min.	Sp.	—	Shoulder Dystocia.

These 19 deaths make an incidence of 1.3 % in the 1452 sodium pentothal anesthetics given, but of course the sodium pentothal is not responsible for all these deaths. First of all, there are many cases within this group in which a maternal and/or fetal factor had been present: as, for instance, placenta previa, premature separation of the placenta, toxemia and congenital heart defects and prematurity, all of which in themselves might already have been the main factor in the infant's death; so, also, in the two stillborn cases in which a mechanical factor and maljudgment as to the type of delivery had been present. Besides all these, is the lack of sufficient autopsies an important factor in determining the exact cause of death.

Though it is hazardous to eliminate cases, it is important to know which deaths could definitely have been caused by the anesthetic. If we look at the cases in which asphyxia was present, then it appears that there are only nine such cases, in all but four of which (2—9—11 and 15) a definite other factor was present too. In conclusion, the only statement that can be made is that to arrive at accurate figures on anesthetic deaths, much more information with accurate and extensive histories of labor and delivery and autopsies are necessary which still leaves the unknown factor of the individual sensitivity to these drugs.

As can be seen, however, the risk is small in well-trained hands.

Inhalation Anesthesia

For inhalation anesthesia, ether and/or nitrous oxide has been used. Intravenous sodium pentothal had been used in the cases mentioned here below, that did result in fetal or neonatal death as the original anesthetic and gas anesthesia was given because major relaxation was required or because the procedure took too long for this intravenous anesthetic.

There were five neonatal deaths and two intrapartum deaths with death during the anesthesia.

Neonatal Deaths: In the below-described cases, the numbers have the same meaning as the ones used in the sodium pentothal group.

	1	2	3	4	5	6	7	Description
1.	Vers. & Extr.	?	—	1000 mg. sod. pent., ether	36 min. 14 min.	Res.	2 hrs.	Failed high-forceps. Hydrocephalus with spina bifida.
2.	Vers. & Extr.	3570 gm.	- 7 h.	? mg. sod. pent., ether	30 min.	Res.	?	Failed high-forceps. Severe superimposed toxemia.
3.	Vers. & Extr.	2850 gm.	—	? mg. sod. pent., ether	9 min.	Res.	3 hrs.	Transverse presentation of fetus.
4.	C.S.	3870 gm.	- 4 h.	1000 mg. sod. pent., ether, nitrous oxide	104 min.	Res.	38 hrs.	Failed forceps. Autopsy: Cerebral hemorrhage & bronchopneumonia
5.	Spont.	4440 gm.	—	? mg. sod. pent., ether		Res.	30 hrs.	Failed conversion of face invertex and failed vers. & extr. Delivered spont. after two hours.
6.	Mid F.	?	?	? mg. sod. pent., ether	54 min.	s.b.	—	Cervical dystocia & sec. uterine inertia.
7.	C.S.	5190 gm.	- 3 h.	? mg. sod. pent., ether, nitrous oxide	125 min.	s.b.	—	Failed high-forceps.

In all these cases, besides the anesthetic, there has been a mechanical factor which might have been responsible for the death of fetus or infant. Most of these probably could have been saved if another attitude as to the type of delivery had been taken. This brings us to the second part of this chapter.

PREVENTABLE DEATHS

These are the deaths of infants and fetuses that could have been prevented. Though in some of these a maternal and/or fetal factor may have been present too, the misjudgment of the cases was of major importance. Most often this is realized only during or after the procedure, because perhaps in similar cases previously a good outcome had been reached. But this should not be an excuse for the death of the fetus or infant.

As will be seen, a higher incidence of caesarean sections, not elective, but as an emergency procedure, might have saved several infants. But it has to be realized too, that, especially in young females caesarean sections are not always the solution, since in some regions of the world this procedure would make them obstetrical cripples, as specialistic help is not everywhere available.

Though the interpretation as to the responsibility for the death of the fetus or infant is subjective, I have tried to select those cases in which, after careful reading of the histories, the misjudgment or delayed intervention was a major factor.

Sixteen of the thirty-one intrapartum deaths, and twelve of the one hundred and three neonatal deaths I classified as preventable.

Intrapartum Deaths

- 3 Cervical dystocia, of which two in nulliparae.
- 7 Uterine inertia, primary or secondary. All seven in nulliparae.
- 3 Failed forceps.
- 1 Prolapse of cord in a nullipara.
- 1 Shoulder dystocia.
- 1 Premature separation of the placenta.

16

Two of these 16 cases were delivered by caesarean section. In both cases, one a premature separation of the placenta and the other a failed forceps, an earlier caesarean section might have saved these

fetuses. In all the other cases, except for the one where a shoulder dystocia existed, caesarean section would have been in order, since other management did not succeed.

Neonatal Deaths

- 2 × a breech extraction without anesthesia of which one was a premature infant. In both of these, on autopsy, cerebral hemorrhage was found.
- 3 × failed forceps trial.
- 1 × after a version & extraction. No autopsy.
- 1 × after a failed conversion of a face presentation that delivered spontaneous after.
- 1 × prolapse of the cord, which also had a true knot in it, in a diabetic patient.
- 1 × precipitate breech delivery. This was a precipitate breech delivery up to the shoulders in the labor room. The head was found to be extended and an emergency delivery was further accomplished.
- 1 × breech delivery where the occiput rotated posterior and considerable difficulties were encountered in delivering the infant.
- 2 × cervical dystocia. Caesarean section might have saved these infants.

These 28 cases make an incidence of 0.44 % of all births and 20 % of all the intrapartum and neonatal deaths. Although this figure seems to be very high, this does not mean that all these could definitely have been saved, but only that had the case been handled differently an infant might have been saved.

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XI

ABORTIONS AND MOLAPREGNANCIES

There were 517 patients admitted with an incomplete or inevitable early abortion and 76 with a late abortion. This total of 593 is 9.8 % of the total deliveries in this same period. This is about the same incidence as in the Chicago Lying-In Hospital where an incidence of 10 % was found ¹.

That this percentage in the population is much higher, however, is shown in a review made of 1610 patients over a two-year period.

In Table XLIX this review is summarized into three parity groups and the percentage is the incidence of one or more abortions in these patients.

TABLE XLIX

Abortions

Para 0	Para I—V	Para VI—up
11.1 %	24 %	39.7 %
Total cases with one or more abortions 20.3 %		

Later reviews with the total fetal wastage (abortions, stillborn fetuses and infants that died in the neonatal period) taken into account gave a lower incidence in the Para 0 group (7.6 %), same percentage for the middle group and a higher percentage for the last group, of over 50 %. This might indicate that more pregnancies in the nulliparae are saved. Of the 126 patients that were hospitalized with a threatening abortion and whose end result could be traced back in the clinic folders, about one-third aborted after they had been discharged from the hospital.

Early Abortions

To this group belong all uterine pregnancies that aborted within 16 weeks of the gestation.

Of these 517 cases, more than half (282 patients) needed a curettage to complete the abortion.

Twenty-one, or 4 %, were admitted in shock and 76, or 14 %, had a secondary anemia due to blood loss. Of all these patients 47 received one or more blood transfusions.

In 17 cases there was a possibility that the abortion had been induced, but in none was a definite proof obtained.

Forty-eight or 9.2 % had, or developed fever of over 38 degrees Celsius.

Age: Fifty percent of the patients were over 30 years of age (and of these again half over 35 years). Since about 57 % of deliveries occur in women under 30 years of age, this would indicate that abortions are slightly more frequent in older women.

Race: Here we see about the same distribution as for the deliveries.

	Abortions	Deliveries	Incidence as against Deliveries
Arubans	43 %	42 %	1 in 11
Negroes, etc.	50 %	51 %	1 in 11
Whites	7 %	7 %	1 in 11

The significance of this lies possibly only in the fact that the incidence is the same in all three groups.

Seasonal Influence?

Most deliveries here occur in the months of August through January. This has been noted over all these years. This indicates that the frequency of conception is subject to a cycle and occurs about nine months before. This is in the months of November through April. It is expected that the conceptions for the abortions is in this same period, unless a conception outside of this period would have a greater chance to be lost early by a seasonal factor. But as is seen below, no such time of the year could be found.

In Table L are shown the percentages of deliveries in the twelve months of the year and the months of the conception for the viable pregnancies and for the abortions. The numbers in the top row indicate the months of the year.

TABLE L
Seasonal Cycle of Conceptions

Months	1	2	3	4	5	6	7	8	9	10	11	12
% Deliveries.	8.7	7.2	6.8	7.2	7.6	7.1	7.5	8.2	9.5	10.4	9.4	9.7
Conception for Deliv. .	10.4	9.4	9.7	8.7	7.2	6.8	7.2	7.6	7.1	7.5	8.2	9.5
Conception for Abort. .	9.8	11.9	8.6	7.6	7.0	6.5	7.8	6.7	6.8	6.8	8.8	11.2

Pathology

Pathology found in these patients as a possible factor in these abortions is shown below. As will be noted, in 92 % of the cases no obvious cause could be detected.

Myomata	16 *
Positive Kahn.	9
Sickle Cell Anemia	3
Hypertension	3
First Pregnancy	
After a recent C.S.	3
Cauterization of Cervix	1
Potassium Permanganate Burns	2
Unknown.	480
Total.	517

* (including one hysterectomy).

Potassium permanganate burns of the vagina and cervix are seen occasionally. This chemical is not always used as an abortive, but by some it is used as a cleansing vaginal douche in which particles of the tablets are left with the chemical burn as result. It is not always possible for us, possibly it is for the patient, to diagnose an early pregnancy, especially if the tablet or douche is taken a few days after the "missed" menstrual period.

During this period, there were 14 patients that needed to be hospitalized because of severe blood loss caused by potassium permanganate burns. Six of them needed blood transfusions. Seven of these patients most likely were not pregnant or possibly were very early in their pregnancy, but have not been seen by us after this hospital stay. Two patients aborted, of which one most likely had a threatening abortion before the insertion.

Two delivered later in this hospital of the recent pregnancy. About the remaining three, no further information is available.

Late Abortions

The late abortions considered here are the wasted pregnancies with non-living fetuses, with a gestation of 16—28 weeks. This is the same as partus immaturi, except that the fetus had no signs of life. Of the 76 cases, thirteen needed surgical intervention to complete the abortion.

In Table LI we see the type of onset of the abortion and the condition of the fetus. As will be seen, the fetuses of the abortions that started out with bleeding have often a normal appearance. This might indicate that if treatment is possible, these might have the most chance to be saved. This is in contrast with the abortions that start out with pain, which patients consequently might be saved from costly treatment.

TABLE LI

Early Symptoms in Late Abortion & Condition of Fetus

		Macerated	Normal	Unknown
Premature Rupture of the Membranes	10	4	6	—
Pain	23	13	6	4
Bleeding	28	8	18	2
Pain + Bleeding	12	3	6	3
Unknown	3	1	1	1
Whole Group	76	29	37	10

Rhesus Factor

Of the 76 women with a late abortion, 67 were Rhesus positive. Six were Rhesus negative and for three the type of Rhesus factor was not determined. These six Rh negative women give an incidence of 8.2 % for this group, as against 7.7 % overall incidence in our delivered patients. In these six women there was no indication that any Rhesus antagonism existed. These findings indicate that the Rhesus factor is of no importance in these late abortions.

Sex of the Fetus in Late Abortions

In the majority of the fetuses no description of the sex of the fetus was made in the charts. Fourteen were female and sixteen were male and the remaining 46 were not described.

Race of the Mothers in Late Abortions

This shows a higher incidence in the Negro part of the population and a lower incidence in the White group as against the delivery ratio.

	Late Abortions	Deliveries	Incidence as against Deliveries
Arubans	38 %	42 %	1 in 86
Negroes, etc.	57 %	51 %	1 in 71
Whites	4 %	7 %	1 in 140

The explanation for this lower incidence in Whites may be that they seek earlier prenatal care.

Age of the Mothers with Late Abortions

Thirty-eight or 50 % were over 30 years of age.

Pathological Findings

Pathological findings in the patients as to a possible influencing factor in these late abortions were few. In nearly 2/3 (64 %) no pathology was encountered at all.

Sickle Cell Anemia	3
Marked Anemia	5
Hypertension.	5
Uterine Myomata	4
Positive Kahn Reaction	4
Acute Gonorrhea	1
Poly-Hydramnios	1
Malformed Fetus	1
Twins	1
Bicornuate Uterus	1
Placenta Previa.	1
Unknown	49
Total	76

Habitual Abortions

A habitual abortion is defined as a succession of three or more spontaneous abortions of a gestation of 28 weeks or less. This might be primary that is, with no viable pregnancies before, or secondary with previous viable pregnancies. As it was not always mentioned in the histories of the other patients whether the abortions were successive, I cannot state if our incidence is correct. It might be higher than the quoted figures, especially for the group with secondary successive abortions.

To the primary group belong eleven patients and to the secondary group eighteen. This is a total of 29, or more than 4.8 % of all the abortions. Most of the patients received treatment with hormones, as stilbestrol or progesterone, besides thyroid, vitamins, etc.

In Table LII is shown the end result of the pregnancies. In the first column the total cases and in the second column the total cases which received treatment with hormones.

TABLE LII
Outcome of Pregnancies in Patients with Habitual Abortions

Outcome	Primary		Secondary	
	Total	Rx	Total	Rx
Abortion	5	4	6	2
Viable Fetus Delivered	6	4	12	12
Whole Group	11	8	18	14

Of the 22 treated, eighteen delivered a viable fetus. Of the 4 treated cases in the primary group that aborted, three received stilbesterol, with dosages as advised by Smith and Smith, and one received parenteral estrogens and progesterone. The four delivered cases had treatment in the same ratio as the aborted cases. The delivered cases in the secondary group give the impressive result that treatment was beneficial. But, as pointed out by Speert², these patients already have a better chance to get viable pregnancies than the primary habitual aborters, even without any treatment with hormones, and he does not see any apparent value in hormonal treatment in contrast with the opinion of Smith and Smith³. Our group is too small to get a

definite opinion. In addition, it should also be mentioned that the better medical care and improved general hygienic measures, diet, etc. are of great importance. Furthermore, most of the abortions had occurred at home without previous medical attention.

As far as we know, the infants of these women were normal.

Of 16 cases, where two successive abortions had occurred, one was anencephalic, one had a congenital heart defect and one a complete harelip. These three women had received hormonal treatment. Compared with the above, there is no indication that treatment should be withheld to women with habitual abortions, on the grounds of possible malformed offspring.

Ectopic Pregnancies

There were 25 cases of ectopic pregnancy, and 5 that were clinically ectopic pregnancy but of which our diagnosis could not be confirmed by the pathologist.

Of these 25, were:

Tubal Abortions	11
Ruptured Tubal Pregnancies. .	11
Intact Ectopic Pregnancies. . .	3

Onset and Signs:

In the ruptured tubal pregnancies, shock was the most prominent symptom. Five patients were admitted in shock, of which one had no prodromal signs as external bleeding or pain.

Three patients went into shock shortly after vaginal examination.

Two patients went into shock when under observation.

One patient had only vaginal bleeding and pain. This pregnancy had ruptured into the meso-salpinx .

Of the 11 patients with tubal abortion, only two developed mild signs of collapse.

There was one patient that within three years had a ruptured tubal pregnancy twice and she had previously three normal pregnancies and deliveries.

Parity of these patients

Three were nulliparae.

Thirteen had normal pregnancies before, of which three also had abortions. One had no living children. This patient had a parity of 6-2-3-0. The three infants that died in the neonatal period were two

term and one a premature infant. Later on a duodenal ulcer was detected, this possibly might point to a psychosomatic factor for the ectopic insertion in this patient.

Pathology found in these patients, which might have influenced the ectopic insertion, was minimal. In 19 of the 25 cases no pathology was found. In four, uterine myomata were present; in one, bilateral salpingitis, and one had a previous pelvic operation.

Age

Nineteen of the 25 women were 30 years or older (76 %). In the delivered group only 41 %.

Gestation Time

The oldest conception product was 11 weeks, counted as off the last menstrual period.

Race

It was more frequent in the Negro group of our patients. Sixty-eight percent of the ectopic pregnancies were present in this group and they are responsible for only 51 % of the total deliveries.

	Ectopic		Deliveries	Incidence as against deliveries
	Total	Percentage	Percentage	
Negroes, etc.	17	68 %	51 %	1 in 180
Arubans.	7	28 %	42 %	1 in 360
Whites	1	4 %	7 %	1 in 420

There was one maternal death. This is an incidence of 4 %. This case is described below.

Case nr. 46063. Negro, parity 4-0-0-3. Her last menstrual period had been two months previously. She was hospitalized because of abdominal pain and vaginal bleeding. Three days after admission she went suddenly in shock. The diagnosis of ruptured ectopic pregnancy was made. Blood transfusions were given and a laparotomy performed. The patient expired at the end of this procedure. An autopsy was performed and an air-embolism in the heart was found. This patient received blood under air pressure and it is possible that air had mixed with this blood which caused the air-embolism.

MOLA PREGNANCY

In this eight-year period there were four mola pregnancies. This is an incidence of 1 in 1500 deliveries. (In 1955 two more cases were seen, which would make the incidence 1 in 1150 deliveries in over 6900 deliveries.) Novak and Sheah believe the incidence in the U.S.A. to be about 1 in 2500 deliveries. This would make the frequency of this abnormality here slightly more often ⁴.

Of the four cases in this seven-year period, three were multiparae, 35, 40 and 41 years of age respectively. The one nullipara was 20 years old. This nullipara did require a total hysterectomy three months after the delivery of the mola because of continuous blood loss after curettage, and a still positive rana (pipiens) test. One ovary of this patient also contained a dermoid cyst and was removed, the other was left in situ. The pathological diagnosis was benign hydatiforme mole with very impressive trophoblastic activity. Four years after this operation, the patient is still in good condition and the rana tests remain negative.

There was one death in this group of patients which possibly might have been due to chorion epithelioma. This case is described below:

Case nr. 38185. Aruban woman. Parity 12-1-1-9. After a four-month amenorrhea, patient began to have uterine bleeding. Two months after this she delivered a mola pregnancy spontaneously. The uterine cavity had to be curetted twice because of recurrent and prolonged bleeding. One month after the delivery a total hysterectomy with bilateral salpingo-oophorectomy was performed because of the continuous bleeding, though the rana (xenopus) test was twice negative. The pathological diagnosis was benign hydatiforme mole. In the specimen a marked infiltration of the mola tissue in the myometrium was noted.

Four months after, a rana (pipiens) test was positive. The patient was not seen again until three years after this. She was then hospitalized in a critical condition. The rana (pipiens) test was positive and an abdominal mass was noted. An X-ray of the chest revealed a shadow in the left lung, but was not typical for chorion-epithelioma metastasis. There were no vaginal lesions seen. The patient expired ten days after admission. An autopsy was refused. No definite diagnosis could be made.

Of the two other cases, one became pregnant again later and delivered at term a normal infant; no further information is available on the other.

References

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- ² SPEERT, HAROLD, *Am. J. Obst. & Gyn.* 68: 665, 1954.
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- ⁴ NOVAK, EMIL and SEAH, C. S., *Am. J. Obst. & Gyn.* 68: 376, 1954.

